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HOCKANUM RIVER DAM (C..(U) CORPS OF ENGINEERS WALTHAM
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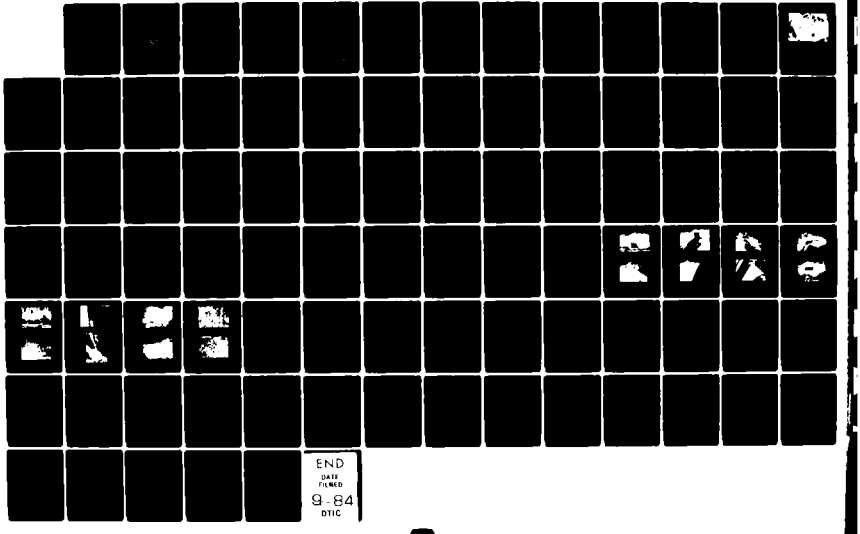

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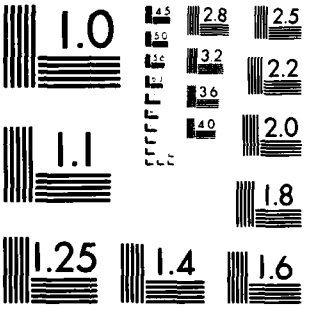

CONNECTICUT RIVER BASIN
VERNON , CONNECTICUT

HOCKANUM RIVER DAM
CT 00620

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEER
WALTHAM , MASS. 02154

MAY 1980

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Hockanum River Dam consists of a 28 foot long earth embankment with vertical stone masonry walls on the upstream and downstream faces. Based on the visual inspection the Hockanum River Dam appears to be in fair condition. For the combination of dam size (small) and downstream hazard (high), a range in the magnitude of the spillway test flood of ½ PMF to PMF is given.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED

OCT 28 1980

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

Inclosed is a copy of the Hockanum River Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Ano-Coil Corp, Rockville, Conn.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

HOCKANUM RIVER DAM

CT 00620

CONNECTICUT RIVER BASIN

VERNON, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	CT 00620
Name of Dam:	Hockanum River Dam
Town:	Vernon
County and State:	Tolland, Connecticut
Stream:	Hockanum River
Date of Inspection:	7 November, 1979

BRIEF ASSESSMENT

The Hockanum River Dam consists of a 28 foot long earth embankment with vertical stone masonry walls on the upstream and downstream faces. A concrete spillway 80 feet in length extends from the earth embankment to the left abutment. The maximum height of the dam is 37 feet.

Historically, the dam was utilized to provide water power for a mill that was once located at the dam site. Presently the dam and its associated impoundment serves to provide for recreational and aesthetic usage. Hockanum River Dam has a maximum storage volume of 34 acre-feet and a height of 37 feet; the size classification is thus "small." The areas of probable dam failure impact include heavy industry and commercial establishments located along West Main Street in the Village of Rockville. Approximately 12 buildings would be flooded with 2 feet or more of water above their ground floors. With the possibility of the loss of more than a few lives and the probability of excessive economic losses the dam has been classified as having a "high" hazard potential.

Based on the visual inspection the Hockanum River Dam appears to be in fair condition. Several trees are growing on the crest and upstream face of the dam. Seepage was observed on the downstream face near the left end of the earth embankment section. There is a hole in the stone masonry about 7 ft. down from the crest of the dam. The visible portion of the spillway and training walls were in poor condition with the concrete having a rough surface due to erosion and spalling.

For the combination of dam size (small) and downstream hazard (high), a range in the magnitude of the spillway test flood of 1/2 PMF to PMF is given. A spillway test flood of the 1/2 PMF selected for this project. The maximum spillway capacity without

overtopping is 1950 CFS. The capacity of the spillway is inadequate to pass the 1/2 PMF test flood outflow of 5,100 CFS without overtopping the dam. The test flood would overtop the dam by 3.1 feet. The spillway is adequate to pass 38 percent of the test flood outflow without overtopping the dam.

Within one year of receipt of the Phase I Inspection Report, the owner should retain a qualified registered engineer to accomplish the following: 1) Conduct more refined hydrologic and hydraulic analysis to determine the need for and methods of increasing the project discharge capacity. 2) Determine procedures for removal of the trees growing on the earth embankment section, and within 10 ft of the upstream and downstream face, including selection of suitable fill materials for backfilling the voids left after removal of the tree root systems. 3) Investigate the seepage occurring on the downstream face of the earth embankment section and design remedial measures if necessary. 4) Inspect the spillway during non-overflow conditions and 5) Provide a low level outlet or a means of dewatering the reservoir in an emergency. The owner should carry out the recommendations made by the engineer.

The owner should also carry out the following operational and maintenance procedures: 1) Repair the hole in the stone masonry of the downstream face. 2) Clear brush from the crest of the earth embankment section and from the area within 10 ft. of the downstream face. Brush should be prevented from growing on the downstream face. 3) Cut down the trees growing adjacent to the top and base of the stone masonry wall on the right side of the downstream spillway channel, and brush should be prevented from growing on the face of the wall. 4) Institute a program of annual technical inspections of the dam and its appurtenances by a qualified registered engineer and 5) Repair all spalled and deteriorated concrete and/or masonry in the spillway section and training walls. 6) Provide a suitable access to the outlet control valve. 7) Insure the operability of the 12" diameter, high level outlet and 8) Establish a surveillance program for use during and immediately after heavy rainfall, and also a warning program to follow in case of emergency conditions.

S. Giavara, P.E.
President

Registered CT 7634

This Phase I Inspection Report on Hockanum River has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

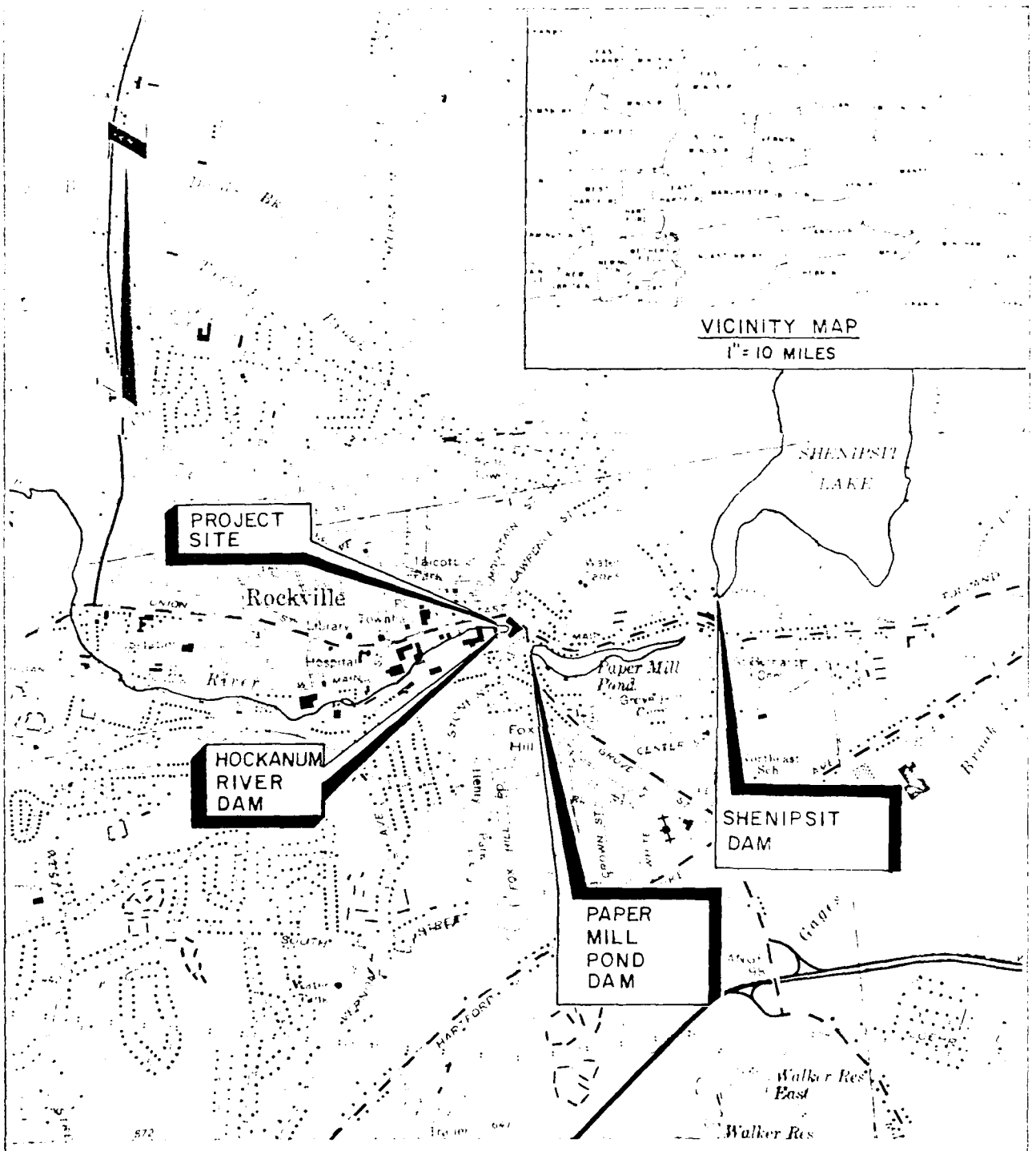
Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

APPENDIXES

OVERVIEW PHOTO
Rockaway River Dam



HOCKANUM RIVER DAM

LOCATION MAP

VERNON , CONNECTICUT

FLAHERTY • GIAVARA ASSOCIATES P.C.

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
HOCKANUM RIVER DAM - CT 00620

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL:

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection through the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Flaherty Giavara Associates, P.C. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to Flaherty Giavara Associates, P.C. under a letter of 19 October 1979 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0001 has been assigned by the Corps of Engineers for this work.

b. Purpose.

1) Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

2) Encourage and assist the States to initiate quickly effective dam safety programs for non-federal dams.

3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF THE PROJECT:

a. Location. The Hockanum River Dam is located in Vernon, Connecticut within the Village of Rockville. Access to the dam is from East Main Street to the rear of Ano-Coil Corp. The reservoir is shown on the U.S.G.S. Topographic Map "Rockville, Connecticut" at a latitude of 41° 52' 15 " and a longitude of 72° 26" 00". The Location Map on page vi shows the location of the dam.

b. Description of Dam and Appurtenances. The Hockanum River Dam consists of a 28 foot long earth embankment with vertical stone masonry walls on the upstream and downstream face. A concrete spillway 80 feet in length extends from the earth embankment to the left abutment. The maximum height of the dam is 37 feet.

The crest of the earth embankment/masonry dam is approximately 22 feet in width. The crest elevation of the dam varies. Beginning at the spillway section the dam crest elevation is 438.8 NGVD for a distance of 23 feet. At this point there is a 3.5 feet vertical rise (masonry wall) in the dam crest to an elevation of 442.3 which extends level to the right abutment. Below the earth embankment masonry dam is a paved parking lot for an adjacent factory building that is located over the underground conduit that carries the spillway discharge.

The spillway section is a concrete faced, ogee type crest, with a near vertical downstream face. The left abutment of the spillway is a rock ledge formation. The spillway crest elevation is 435 feet NGVD. The right spillway training wall consists of a short concrete section immediately adjacent to the spillway and a mortared stone masonry section extends further downstream, forming the right wall of the downstream spillway channel. The left spillway training wall consists of a short concrete and mortared stone masonry section at the crest of the spillway. Downstream from the crest, the spillway flow is channeled by the bedrock face exposed at the left abutment. The spillway discharges to a shallow bedrock plunge pool from which it flows through a stone masonry arch tunnel that extends downstream under a parking lot and factory building.

The outlet works consists of a variety of conduits and penstocks through the dam, most of which have been abandoned.

A high level outlet consisting of a 12" diameter cast iron pipe and valve are located at the left abutment and appear in good condition. The valve is upstream of the dam.

A mid level outlet pipe through the earth and masonry dam has been sealed with concrete and appears to be an abandoned penstock. An inoperable sluice gate control device was found above the blocked pipe, at the top of the dam.

A second mid level penstock through the right side of the spillway has also been abandoned. The seal was not visible nor was its control gate.

A gate valve operating stem, without a handle, was found on top of the dam, but no corresponding outlet pipe could be located.

c. Size Classification. Hockanum River Dam has a maximum storage volume of 34 acre feet and height of 37 feet. A dam height of greater than 25 feet but less than 40 feet classifies this structure in the "small" category according to guidelines established by the Corps of Engineers.

d. Hazard Classification. The dam is classified as having a "high" hazard potential. The areas of probable impact include heavy industry and commercial establishments located along West Main Street in the Village of Rockville, both alongside of and over the river. Approximately 12 buildings would be flooded with 2 feet or more of water above their ground floors. With the potential loss of more than a few lives and the probability of excessive

economic losses the dam has been classified as having a high hazard potential.

e. Ownership. The dam is owned by Ano-Coil Corp., 60 East Main Street, Rockville, Ct. Phone: 203-872-0531.

f. Operator. The operator of the dam is Mr. H. Marko of Ano-Coil Corp, phone 203-872-0531.

g. Purpose of Dam. Historically, the dam was utilized to provide water power for a mill that was once located at the dam site. Presently the dam and its associated impoundment serves to provide for recreational and aesthetic usage.

h. Design and Construction History. There is no design or construction information available for this dam. It is believed that it was constructed in the 19th century in conjunction with a factory to provide water power.

i. Normal Operation Procedure. The outlet works are closed or inoperable; therefore, the water level is maintained principally by the spillway crest elevation.

1.3 PERTINENT DATA:

a. Drainage Area. The drainage area is 17.1 square miles of rolling uplands, mostly rural and generally wooded. Almost the entire watershed discharges through the Shenipsit Reservoir located 3500 feet upstream from the dam.

b. Discharge at Site.

1) The outlet works consists of a high level 12 inch diameter cast iron pipe which appears to be in good condition, and two inoperable and abandoned mid level outlet conduits. The invert elevation of the high level outlet pipe is estimated to be 432 NGVD, with an outlet capacity of 5 CFS.

2) USGS reports a peak flow at Shenipsit Lake of 1500 CFS in September 1938.

3) The ungated spillway capacity at the top of dam - 1950 CFS @ El. 438.8.

4) The ungated spillway capacity at the test flood elevation - 4,780 CFS @ El. 441.9.

5) The gated spillway capacity at normal pool elevation is not applicable at this dam.

6) The gated spillway capacity at test flood elevation is not applicable at this dam.

7) The total spillway capacity at test flood elevation - 4,780 CFS @ El. 441.9

8) The total project discharge at the top of dam - 5580 CFS @ El. 442.3.

9) The total project discharge at test flood elevation - 5,100 CFS @ El. 441.9.

c. Elevation. (Feet above NGVD)

1) Streambed at toe of dam..... 402

2) Bottom of cut-off.....Unknown

3) Maximum tailwater.....Unknown

4) Recreation pool.....N/A

5) Full flood control pool.....N/A

6) Spillway crest.....435

7) Design surcharge (Original Design).....Unknown

8) Top of dam.....438.8-442.3

9) Test flood design surcharge.....447.3

d. Reservoir. (Length in feet)

1) Normal pool.....200±

2) Flood control pool.....N/A

3) Spillway crest pool.....200±

4) Top of dam.....250±

5) Test flood pool.....300±

e. Storage. (acre-feet)

1) Normal pool.....18

2) Flood control pool.....N/A

3) Spillway crest pool.....18

4) Top of dam.....22

5) Test flood pool.....20

f. Reservoir Surface. (acres)

1) Normal pool	0.5
2) Flood control pool	N/A
3) Spillway crest	0.5
4) Test flood pool	0.8
5) Top of dam	0.7

g. Dam.

1) Type:	Earth embankment with U/S & D/S vertical masonry walls-concrete spillway
2) Length:	78 feet
3) Height:	37 feet
4) Top Width:	22 feet
5) Side Slopes:	U/S vertical; D/S vertical
6) Zoning:	Unknown
7) Impervious Core:	Unknown
8) Cut-off:	Unknown
9) Grout Curtain:	Unknown

h. Diversion and Regulating Tunnel.

1) Type:	N/A
2) Length:	N/A
3) Closure:	N/A
4) Access:	N/A
5) Regulating Facilities:	N/A

i. Spillway.

1) Type:	Concrete faced ogee crest
2) Length of Weir:	80 feet
3) Crest Elevation:	435 feet

4)	Gates:	None
5)	U/S Channel:	Reservoir
6)	D/S Channel:	Bedrock lined channel & stone arch conduit 8' x 16'

j. Regulating Outlets.

1)	Invert:	430± feet NGVD
2)	Size:	12 inch diameter
3)	Description:	Cast iron pipe
4)	Control Mechanism:	Manually operated valve box

SECTION 2 - ENGINEERING DATA

2.1 DESIGN:

No engineering data has been found to provide any information about the design of Hockanum River Dam.

2.2 CONSTRUCTION:

No information relative to the construction of the dam is available. Information presented in this report was primarily obtained by interviews and direct field measurements of the existing dam.

2.3 OPERATION:

Formal operation records are not available for this dam.

2.4 EVALUATION:

a. Availability. There are no plans, specifications or computations available from the owner or state regarding the design, construction or subsequent repairs and modifications to this dam.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of the dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on the visual inspection, the dam's past performance, and sound engineering judgement.

c. Validity. There is no reason to question the validity of the available data.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS:

a. General. Based on visual inspection, the Hockanum River Dam appears to be in fair condition. The dam appears to have been associated with an old mill which has since been abandoned and dismantled. The right half of the dam is an earth embankment with vertical stone masonry walls forming the upstream and downstream faces. It appears that the former mill was located immediately downstream from the earth embankment section with the downstream stone masonry face of the embankment probably forming one of the walls of the mill. The left half of the dam is a concrete-faced spillway section which extends to the left abutment.

The spillway section appears to be founded on bedrock; bedrock is exposed at the toe of the spillway and at the left abutment. The nature of the foundation materials below the earth embankment section are not known.

b. Dam.

1) Upstream Face - Most of the upstream face of the earth embankment consists of mortared stone masonry. The portion of the upstream face that is visible above the reservoir level appears to be in generally good condition, except for some diagonal cracking of the stone masonry near the transition to the lower section of the embankment containing the abandoned mill outlet works, Photo No. 2. Several trees are growing adjacent to the upstream face at the right abutment, Photo No. 9 and roots from these trees are growing into the stone masonry of the upstream face, as shown in Photo No. 12.

2) Crest - The crest of the earth embankment section is shown in Photo No. 7 and Photo No. 9. The crest elevation in the section at the left end of the earth embankment containing the abandoned mill outlet works is about 3 ft lower than the elevation of the rest of the embankment. The crest is covered with grass and low brush. Several trees are growing on the crest, as shown in Photo No. 7 and Photo No. 9.

3) Downstream Face - The downstream face of the earth embankment section is shown in Photo No. 10. The mortar is missing from many of the joints in the stone masonry and brush is growing in the joints between the stones in several locations. There is a hole in the stone masonry located approximately 7 ft down from the crest, just above the outlet conduit (plugged) for the abandoned mill works. The hole is about 2-ft-high by 3-ft-wide and extends about 6 in. back into the face. Seepage was observed on the downstream face near the left end of the earth embankment section, as shown in Photo No. 15. The highest

elevation of the seepage on the downstream face was about 4.5 - 5 ft below the upstream reservoir level, which was just above the spillway elevation at the time of inspection. There are several trees growing at the toe of the downstream face, some of which have roots growing into the stone masonry of the downstream face.

c. Appurtenant Structures.

1) Spillway - The spillway section is shown in Photos No. 1, No. 4 and No. 6 and water was overflowing the spillway at the time of inspection. The visible concrete was in poor condition, having a rough surface due to erosion and spalling. (See Photo No. 6) The spillway crest was partially obstructed by debris.

The right spillway training wall consists of a short concrete section immediately adjacent to the spillway and a mortared stone masonry section which extends further downstream, forming the right wall of the downstream spillway channel, as shown in Photos No. 4 and No. 7. The stone masonry section appears to be part of one of the walls of the former mill. The concrete section is badly spalled, and mortar is missing from many of the joints in the stone masonry section. Brush is growing in many of the joints in the stone masonry wall and trees are growing adjacent to the top and base of the wall. The top of the stone masonry wall appears to bulge outward where one of the trees is growing at the top of the wall.

The left spillway training wall consists of a short concrete and mortared stone masonry section at the crest of the spillway, as shown in Photo No. 5. Downstream from the crest, the spillway flow is channeled by the bedrock face exposed at the left abutment. (See Photo No. 3)

The downstream spillway channel in the vicinity of the downstream toe is in bedrock. The area adjacent to the toe is strewn with boulders, as shown in Photo No. 13.

2) Outlet Works - Several abandoned outlets associated with the former mill are located at the earth embankment section, Photo No. 10. The conduits for the abandoned mill outlet works have been plugged and are no longer operational as noted below:

There is a conduit protruding from the downstream face of the earth embankment section near the right abutment and a large pipe protrudes from the spillway fact near the right end of the spillway section (see Photo No. 11).

A mid-level outlet pipe through the earth and masonry dam has been sealed with concrete. An inoperable sluice gate control was found above the pipe, at the top of the dam. A second mid-level penstock through the right side of the spillway has also been abandoned.

A conduit and valve structure are located at the left abutment. This "high" level outlet consists of a 12 inch diameter Cast Iron Pipe and valve. (Photos No. 5, and No. 8). The blow-off was not operated during the inspection.

d. Reservoir Area. The perimeter of the reservoir consists of steep wooded slopes that appear to be stable. Bedrock was noted in some slopes. Approximately one-quarter of the perimeter is comprised of old stone masonry mill buildings, apparently in good condition. (See Photo No. 16)

There are two additional dams (Paper Mill Pond and Shenipsit) located within 3500 feet upstream of the Hockanum River Dam. They influence hydrologic conditions at the Hockanum River Dam by storing floodwater (Shenipsit) and controlling and/or divering flow of floodwater around the Hockanum River Dam.

e. Downstream Channel. The spillway discharges into a bedrock plunge pool. (Photo No. 13) The left side of the pool consists of bedrock and overburden. Some overburden and recent fill is apparently sliding into the pool. The right side of the pool consists of a rock masonry retaining wall (about 16 feet high). Portions of the wall are out of plumb and leaning inward toward the pool. Several 6-inch diameter trees are growing on the wall. About 50 feet downstream from the spillway, the spillway discharge enters a 8' high by 16' wide arch (see Photo No. 14) which channels the water below a parking lot and office building located downstream of the dam. The tunnel is in good condition but could be subject to obstruction. Its capacity is unknown.

3.2 EVALUATION:

Based on the visual inspection, the dam appears to be in fair condition. The inspection disclosed the following items which require attention:

a. Trees are growing on the crest of the earth embankment section, at the right abutment adjacent to the upstream face, and at the toe of the downstream face.

b. Seepage is occurring on the downstream face of the earth embankment section.

c. A hole, approximately 2-ft-high by 3-ft-wide, has formed in the stone masonry of the downstream face in the earth embankment section.

d. Brush is growing in the joints between the stones of the stone masonry downstream face.

e. Trees are growing adjacent to the top and base of the stone masonry wall on the right side of the downstream spillway channel, and the wall appears to have bulged outward in the vicinity of one of the trees. Also, brush is growing in the joints between the stones of the stone masonry wall.

f. Concrete in the spillway section and training walls is severely deteriorated and spalled.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES:

a. General. The dam is equipped with a method of lowering the water level by operating a 12 inch blow-off valve. (EL.430.±NGVD)

b. Description of any Warning System in Effect. There is no warning system of any kind in effect at the dam.

4.2 MAINTENANCE PROCEDURES:

a. General. Maintenance of the dam appears to be generally lacking.

b. Operating Facilities. There are no operating facilities at the dam.

4.3 EVALUATION:

Regular operational maintenance for this dam and its appurtenances has not been developed or implemented.

An emergency action plan should be prepared to prevent or minimize the impact of failure. This plan should list the expedient action to be taken and the authorities to be contacted.

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL DATA:

The Hockanum River Dam consists of a 78 foot long earth embankment with vertical stone masonry walls on the upstream and downstream faces, and an 80 foot wide concrete spillway. The spillway has a rounded ogee type crest and a steep downstream face. The maximum allowable head at the spillway is 3.8 feet before overtopping the dam. The left side of the spillway is founded on a steeply sloping visible bedrock surface. The dam was originally built as part of the hydropower complex used in 19th century woolen mills.

The impoundment size at normal stage is approximately 1/2 acre. The estimated normal storage volume (DEP records) is 32 acre-feet.

The watershed area is 17.1 square miles of rolling uplands, mostly rural and generally wooded. Ninety-six per cent of this watershed area discharges through the large Shenipsit Reservoir located 3500 feet upstream of the project site. About ninety nine per cent of the watershed discharges through the small Paper Mill Pond located 400 feet upstream of the project site.

5.2 DESIGN DATA:

No specific data is available for this watershed or the structure at Hockanum River Dam. In lieu of existing design information, U.S.G.S. Topographic Maps (Scale 1" = 2,000') were utilized to develop hydrologic parameters. Some of the pertinent hydraulic design data was obtained and/or confirmed by actual field measurements at the time of the visual field inspection.

5.3 EXPERIENCE DATA:

No records are available in regard to past operation of the impoundment or of surcharge encroachments and outflows through the spillway or outlet. The maximum past inflows are unknown at this dam. The USGS reports a peak flow at Shenipsit Lake of 1500 CFS in September 1938.

5.4 TEST FLOOD ANALYSIS

The test flood for determining the spillway adequacy is based upon Corps of Engineers guidelines. The size classification of the dam is "small," based upon a height of 37 feet and storage volume of 32 acre-feet. The hazard potential is "high," due to land use downstream of the dam and the results of the dam failure analysis. The test flood in the Corps of Engineers guidelines for this size dam and hazard potential ranges from the 1/2 PMF

to the PMF. The recommended spillway test flood is the 1/2 PMF because of the low storage of the impoundment.

The magnitude of the test flood at the Hockanum River Dam is strongly influenced by the Shenipsit Lake Dam (CT 00209) located at the Hockanum River 3500± feet upstream of the project site. Approximately 96% of the Hockanum River Dams watershed flows past the Shenipsit Lake Dam and the much smaller Paper Mill Pond Dam prior to reaching the Hockanum River Dam. The Hydraulic influence of the Shenipsit Lake Dam was evaluated by routing the Test Flood through that structure to determine its outflow rate. The Shenipsit Lake Dam stage-discharge and reservoir area data that was used for routing the flood was based upon a Phase I report dated September, 1978, prepared under supervision of the New England Division of the U.S. Army Corps of Engineers.

The Test Flood was not routed through the Paper Mill Pond Dam. This is because the Paper Mill Pond is too small to store a significant amount of water, and the lack of detailed data. Its outlet is an underground conduit, with subcritical flow at the inlet and super-critical flow at the inlet and supercritical flow at the outlet. The hydraulic control point could not be located. It was assumed that all discharges from the Paper Mill Pond flow into the Hockanum River Dam impoundment without diversion. It amy actually be possible for some flows to overtop the Paper Mill Pond Dam and flow down a road around the Hockanum River Dam. The analysis is conservative as it assumes all water goes into the Hockanum River Dam impoundment.

The inflow hydrograph used to evaluate the Hockanum River Dam was set equal to 104% of the Shenipsit Lake Dam outflow hydro-graph. The 4% additional flow is to approximate the runoff from the additional watershed area tributary to the river betwe.. the two dams.

The inflow hydrographs were routed through the Shenipsit Lake and Hockanum River Dams using a computer program based on stage-storage and stage-discharge data. The reservoirs were assumed to be full with a water surface stage equal to the spillway crest elevation prior to the flood routing.

The analysis indicated the Shenipsit Lake Dam peak inflow rate of 12,400 CFS is reduced (by storage) to a peak outflow rate of 4,900 CFS. The flood routing procedure indicates that the peak inflow rate of 5,100 CFS to the Hockanum River Dam is not reduced significantly by the small impoundment.

The peak test flood stage at the Hockanum River Dam would be at elevation 441.9 NGVD, 3.1 feet above the crest of the dam embank-ment.

The spillway capacity is (1950 CFS) equal to 38 per cent of the peak test flood outflow.

5.5 DAM FAILURE ANALYSIS

The downstream impact of dam failure was analyzed using a computer program developed based upon the Corps of Engineers "Rule of Thumb Guidance for Estimating Dam Failure Hydrographs" dated April 1978 as used in the National Dam Inspection Program.

The peak outflow rate is calculated by combining the dam failure outflow and the pre-failure discharge. Water surface elevations are calculated for both the pre-failure and post-failure conditions at selected stations downstream of the dam. The output data (see Appendix D) is used to define flood prone areas and select the hazard classification of the dam.

Based upon an assumed breach width equal to 40% of the dam's width at mid-height, the peak flood flow due to the failure would be 23,800 CFS. The total flood flow (failure outflow plus spillway discharge capacity) would be 25,800 CFS with an initial flow depth of 12 feet above the parking lot 100 feet downstream of the dam. The total flow rate would rapidly diminish in downstream areas due to the low storage volume in the impoundment. The flow capacity of the stone masonry conduit downstream of the dam has been neglected due to its small size and high susceptability to blockade in the event of a failure.

The probable impact area consists of a heavy industry and commercial property along West Main Street in the Rockville section of the Town of Vernon. Approximately 12 buildings would be flooded with 2 feet or more of water above their ground floors; 9 of these buildings would not otherwise be subject to severe flooding. The relationship of computed elevations and stationing to flood prone properties (pre- and post-failure conditions) is shown on Sheet D-11, Appendix D. With the possibility of the loss of more than a few lives and the probability that damage would be excessive the dam has been classified as having a high hazard potential.

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 VISUAL OBSERVATIONS:

The visual inspection did not disclose any immediate stability problems. However, the trees growing on and adjacent to the earth embankment, the seepage occurring through the embankment, and continued deterioration of the stone masonry downstream face could affect the future stability of the dam.

6.2 DESIGN AND CONSTRUCTION DATA:

There is insufficient design and construction data to formally analyze the stability of the dam. Thus the evaluation of stability is based solely on the visual inspection.

6.3 POST-CONSTRUCTION CHANGES:

No information is available about post-construction changes.

6.4 SEISMIC STABILITY:

Hockanum River Dam is located in Seismic Zone 1 and, in accordance with the recommended Phase I inspection guidelines, does not warrant seismic stability analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT:

a. Condition. Based on a visual inspection, the dam appears to be in fair condition. There are some features which could affect the long-term performance of the dam if they are not corrected as recommended in Sections 7.2 and 7.3.

b. Adequacy of Information. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on the visual inspection, past operational performance of the structure, and sound engineering judgment.

c. Urgency. The recommendations and remedial measures presented in Sections 7.2 and 7.3 should be implemented by the owner within one year of receipt of the Phase I Inspection Report.

7.2 RECOMMENDATIONS:

The following recommendations should be carried out under the direction of a qualified registered engineer:

a. Conduct more refined hydrologic and hydraulic analysis to determine the need for and methods of increasing the project discharge capacity.

b. Determine procedures for removal of the trees growing on the earth embankment section, and within 10 ft of the upstream and downstream face, including selection of suitable fill materials for backfilling the voids left after removal of the tree root systems.

c. Investigate the seepage occurring on the downstream face of the earth embankment section and design remedial measures, if necessary.

d. Inspect the spillway during "non-overflow" conditions. The owner should carry out the recommendations made by the engineer.

e. Provide a low level outlet or a means of dewatering the reservoir in an emergency

The owner should carry out the recommendations made by the engineer.

7.3 REMEDIAL MEASURES:

a. Operation and Maintenance Procedures. The owner should:

1) Repair the hole in the stone masonry of the downstream face.

2) Clear brush from the crest of the earth embankment section and from the area within 10 ft. of the downstream face. Brush should be prevented from growing on the downstream face.

3) Cut down the trees growing adjacent to the top and base of the stone masonry wall on the right side of the downstream spillway channel, and brush should be prevented from growing on the face of the wall.

4) Institute a program of annual technical inspections of the dam and its appurtenances by a qualified registered engineer.

5) Repair and spalled and deteriorated concrete and/or masonry in the spillway section and training walls.

6) Provide a suitable access to the outlet control valve.

7) Insure the operability of the 12" diameter, high level outlet.

8) Establish a surveillance program for use during and immediately after heavy rainfall, and also a warning program to follow in case of emergency conditions.

7.4 ALTERNATIVES:

There are no practical alternatives to the recommendations contained in Sections 7.2 and 7.3.

APPENDIX A

INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Hockanum River Dam **DATE** November 7, 1979

TIME 1430

WEATHER 45°F - Overcast

W.S. ELEV. ____ **U.S.** ____ **DN.S.**

PARTY:

1. R. Smith, FGA, Project Manager
2. J. McBroom, FGA, Hydraulics/Hydrology
3. R. Murdock, GEI, Geotechnical
4. D. Shields, GEI, Geotechnical
5.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Hockanum River Dam DATE: Nov. 7, 1979

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	Note: Earth embankment section has vertical stone masonry upstream and downstream face.
Crest Elevation	438.8 NGVD
Current Pool Elevation	435.0 NGVD
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed.
Pavement Condition	No pavement, grass covered.
Movement or Settlement of Crest	None observed.
Lateral Movement	None observed.
Vertical Alignment	No misalignment observed.
Horizontal Alignment	No misalignment observed.
Condition at Abutment and at Concrete Structures	Trees at right abutment.
Indications of Movement of Structural Items on Slopes	Some diagonal cracking of mortared stone masonry upstream face near left end of embankment section.
Trespassing on Slopes	N/A
Sloughing or Erosion of Slopes or Abutments	Hole, approximately 2 ft x 3 ft, in stone masonry on downstream face.
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or near Toes	None observed.
Unusual Embankment or Downstream Seepage	Seepage on downstream face.
Piping or Boils	None observed.
Foundation Drainage Features	None observed.
Toe Drains	None observed.
Instrumentation System	None.
Vegetation	Trees growing on crest and at downstream toe. Brush on crest and growing in joints in the stone masonry downstream face.

PERIODIC INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Hockanum River Dam DATE: Nov. 7, 1979

AREA EVALUATED	CONDITIONS
DIKE EMBANKMENT	
Crest Elevation	Not applicable
Current Pool Elevation	
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or near Toes	
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	
Toe Drains	
Instrumentation System	
Vegetation	

PERIODIC INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Hockanum River Dam DATE: Nov. 7, 1979

AREA EVALUATED	CONDITIONS
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	N/A
Bottom Conditions	N/A
Rock Slides or Falls	N/A
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	N/A
b. Intake Structure	
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Hockanum River Dam DATE: Nov. 7, 1979

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	Not applicable
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	

PERIODIC INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Hockanum River Dam DATE: Nov. 7, 1979

AREA EVALUATED	CONDITIONS
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	Not applicable
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Hockanum River Dam DATE: Nov. 7, 1979

AREA EVALUATED	CONDITIONS
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain Holes	N/A
Channel	N/A
Loose Rock or Trees Overhanging Channel	N/A
Condition of Discharge Channel	N/A

PERIODIC INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Hockanum River Dam DATE: Nov. 7, 1979

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Approach channel underwater
General Condition	
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	None observed
Floor of Approach Channel	Underwater
b. Weir and Training Walls	
General Condition of Concrete	Concrete section is badly spalled, and mortar is missing from many sections of the stone masonry section. The concrete weir shows evidence of erosion
Rust or Staining	None observed
Spalling	Major areas of spalled noted
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Efflorescence observed
Drain Holes	None observed
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Channel	Bedrock. Strewn with boulders near toe of spillway.
Other Obstructions	None.

PERIODIC INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Hockanum River Dam DATE: Nov. 7, 1979

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SERVICE BRIDGE	
a. Superstructure	No Service bridge
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat and Backwall	

APPENDIX B

ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Hockanum River Dam

I.D. NO. CT-00620

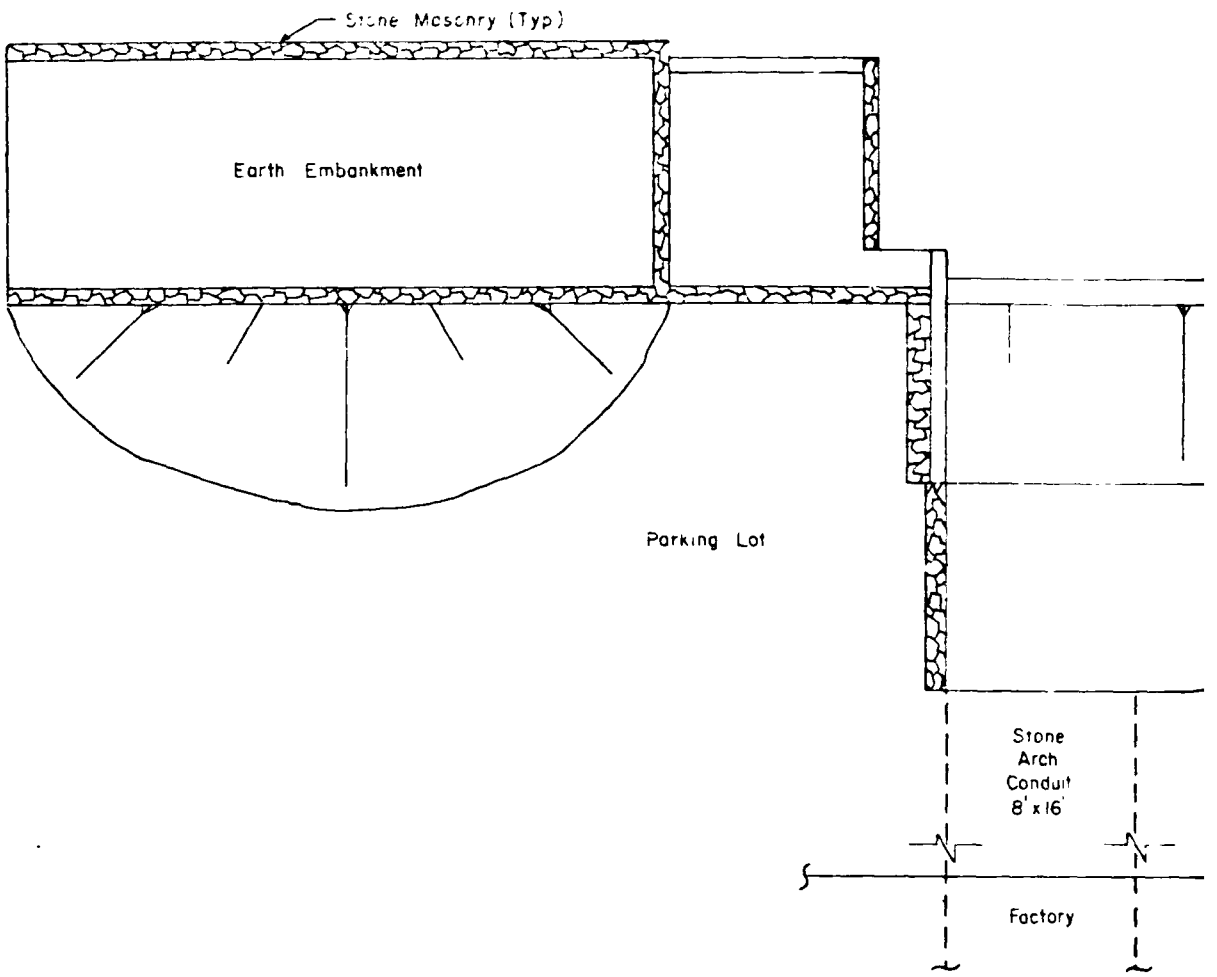
ITEM	REMARKS
AS-BUILT DRAWINGS	None available
REGIONAL VICINITY MAP	Available from U.S.G.S.
CONSTRUCTION HISTORY	None
TYPICAL SECTIONS OF DAM	Field Measurements
OUTLETS - Plan	Field Measurements
- Details	Field Measurements
- Constraints	Unknown
- Discharge Ratings	None available
RAINFALL/RESERVOIR RECORDS	Unavailable
DESIGN REPORTS	None
GEOLOGY REPORTS	None
DESIGN COMPUTATIONS	None
HYDROLOGY & HYDRAULICS	None
DAM STABILITY	None
SEEPAGE STUDIES	None
MATERIALS INVESTIGATIONS	None
BORINGS RECORDS	None
LABORATORY	None
FIELD	None

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

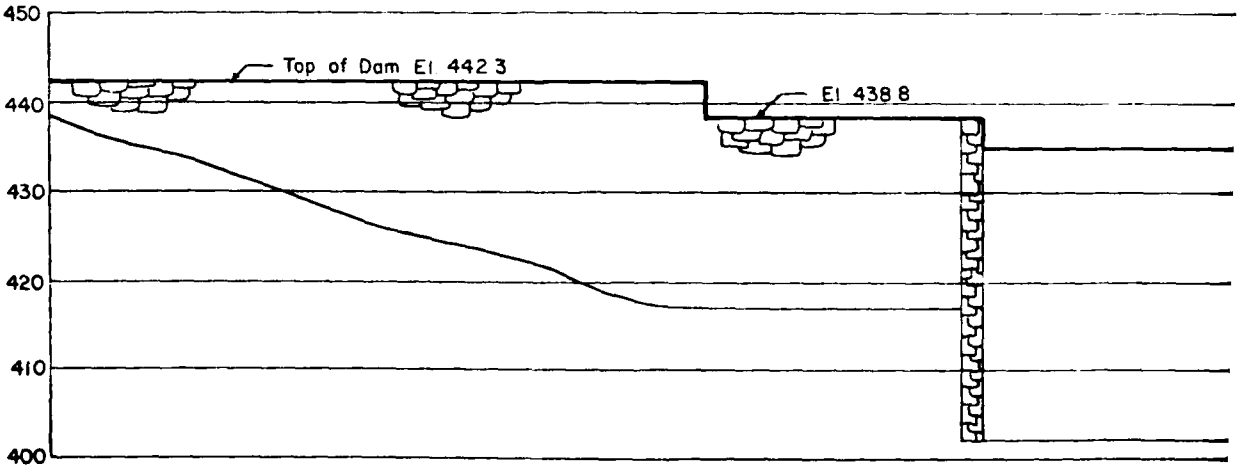
NAME OF DAM Hockanum River Dam

I.D. NO. CT 00620

ITEM	REMARKS
POST-CONSTRUCTION SURVEYS OF DAM	None available
BORROW SOURCES	Unknown
MONITORING SYSTEMS	Unknown
MODIFICATIONS	Plugged outlet works
HIGH POOL RECORDS	None
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Unknown
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Unknown
MAINTENANCE OPERATION RECORDS	Unavailable
SPILLWAY PLAN	
SECTIONS	Field Measurements
DETAILS	Field Measurements
OPERATING EQUIPMENT PLANS & DETAILS	Not available

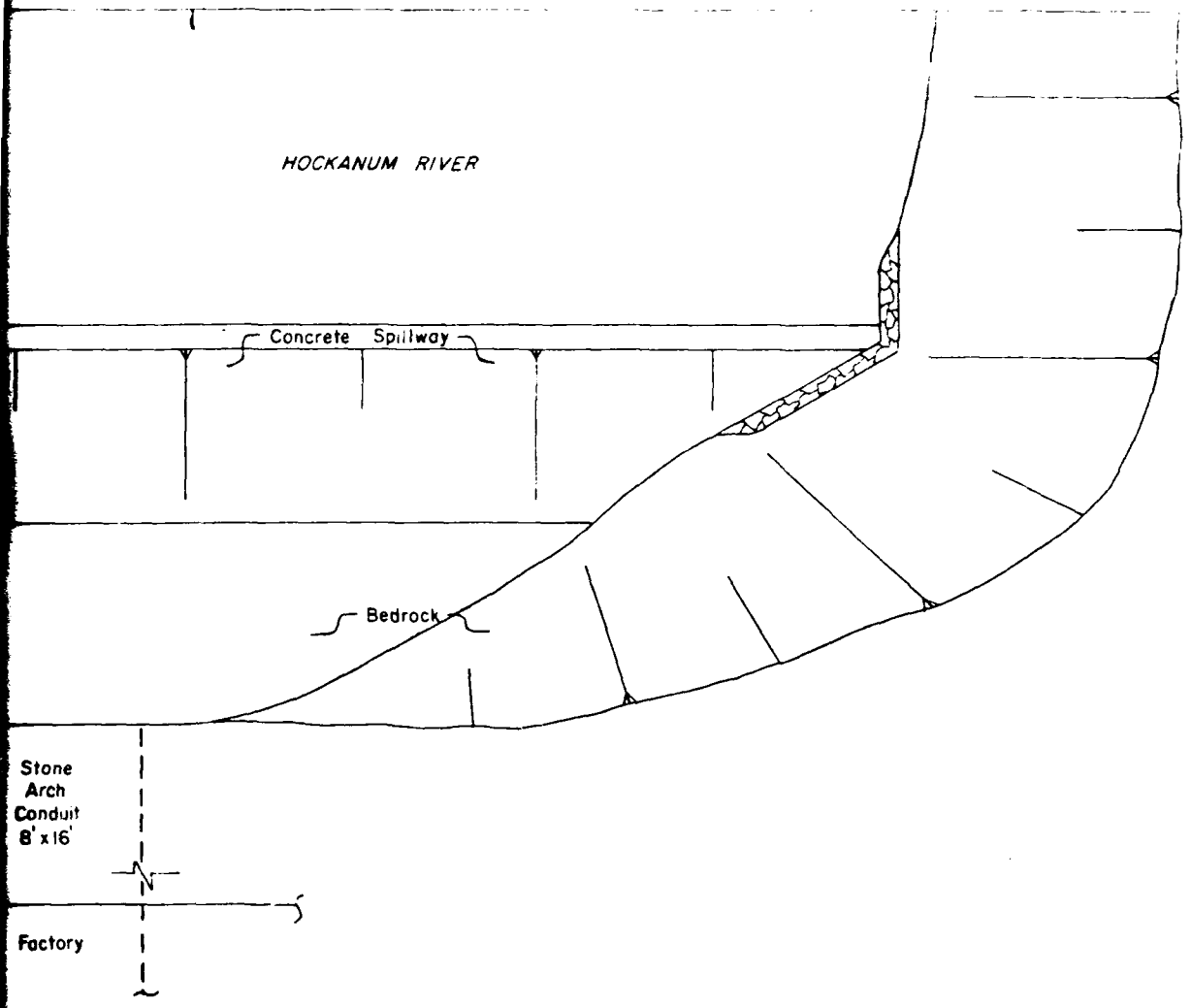


PLAN
NTS



Datum : N G V D.

PROFILE
NTS



PLAN
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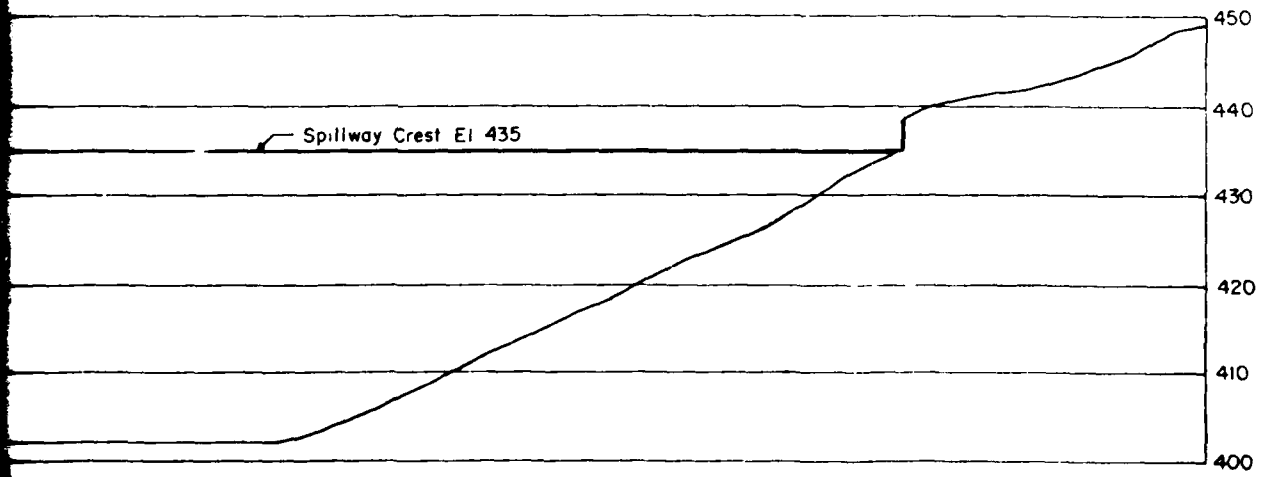


ROFILE
NTS

HOCKANUM RIVER DAM

B-3

COPY

JOHN J. MOZZOCHI AND ASSOCIATES
CIVIL ENGINEERS

GLASTONBURY, CONN
817 HEBRON AVENUE
PHONE 633-9401

PROVIDENCE 3, R. I.
186 DYER STREET
PHONE GAspee 1-0420

JOHN J. MOZZOCHI
ASSOCIATES
OWEN J. WHITE
JOHN LUCHS, JR.
ECTOR L. GIOVANNINI

STATE WATER RESOURCES COMMISSION
RECEIVED
JUN 23 1965

June 23, 1965

ANSWERED
REFERRED
FILED

REPLY TO: Glastonbury

William P. Sander-Engineer - Geologist
Water Resources Commission
State Office Building
Hartford 15, Connecticut

Re: Our File 57-73-70
Dams in Town of Vernon

Dear Mr. Sander:

In accordance with the instructions contained in your letter dated May 10, 1965, I have inspected the six (6) dams listed in the Town of Vernon and have the following to report:

1. Shenipsit Lake Dam - This is a well-built and substantial masonry dam about 40' wide and 20' high with about 6 feet of freeboard. It is in excellent condition and under the surveillance of a full-time caretaker. It is owned by the Rockville Water and Aqueduct Company which is a subsidiary of The Connecticut Water Company. At the present, there are some minor leakage through the mortar jointing but this, I am told by the caretaker, will be taken care of when the reservoir is drawn down next Fall.

2. The small dam immediately below (1) is a dry masonry type dam about 25' wide and 20' high with a freeboard of 6 feet. It appears to be in good condition although leaks could not be ascertained because of overflow conditions. The ownership was not determined. The discharge from this dam goes through an underground passage beneath the building of the Roosevelt Mills and Route 74.

3. The third "Dam" listed in your letter is actually a semi-circular masonry culvert, about 16 feet in diameter, set on a ledge foundation which forms the dam and lake. There is, in addition, a large diameter penstock passing through a mill building, but this appeared to be non-operative at present.

4. The fourth item is an earth-filled masonry faced dam having a concrete spillway about 60' long set on ledge and varying in height from about 10 feet at the south end to about 50' at the north end. The pond created by this dam is barely one acre in area. This dam appears to be substantially built and in good condition.

5. The dam at the Risely Reservoir is an earthen dam approximately 15 feet wide at the crest with masonry facing and loose rock-filled slopes. It is about 400 feet long and varies in height from 4 feet at the ends to about 30 feet at its center. At the easterly end, there is a flat concrete slab spillway about 20' wide with sloping sides on about 3:1 slopes and about 2' high.

I calculate the drainage area for this dam to be about 3.9 sq. miles, with a pond area of about 15 acres.

Using the criteria which we have applied to flood control dams, i.e. that a flood of the Diane type could be expected to follow an antecedent storm, I estimate that the freeboard of this dam is insufficient to prevent overtopping and, presumably, this dam is expected to be so overtopped. In my opinion, a dam of this importance should be constructed to avoid being overtopped.

Therefore, I recommend that the freeboard and the spillway on this dam be increased sufficiently to provide an additional margin of safety and thereby prevent any possible overtopping of the earthen portion of the dam.

6. The unnamed dam just south of the Wilbur Cross Highway is just downstream of Lake Street rather than upstream. It is a dry masonry dam about 100' in length and about 30' high at its highest point. It is set on ledge in a narrow rocky ravine and the whole dam acts as a spillway. There appear to be numerous leaks through the joints in the masonry, but no noticeably evidence of bulging or other movement of the dam. The discharge over this dam is controlled by the span of the bridge carrying Lake Street over the pond. This span appears to be about 40 feet, or less than 1/2 of the length of the dam.

I believe this dam is in no danger, but I recommend that repairs be made to reduce the amount of leaks.

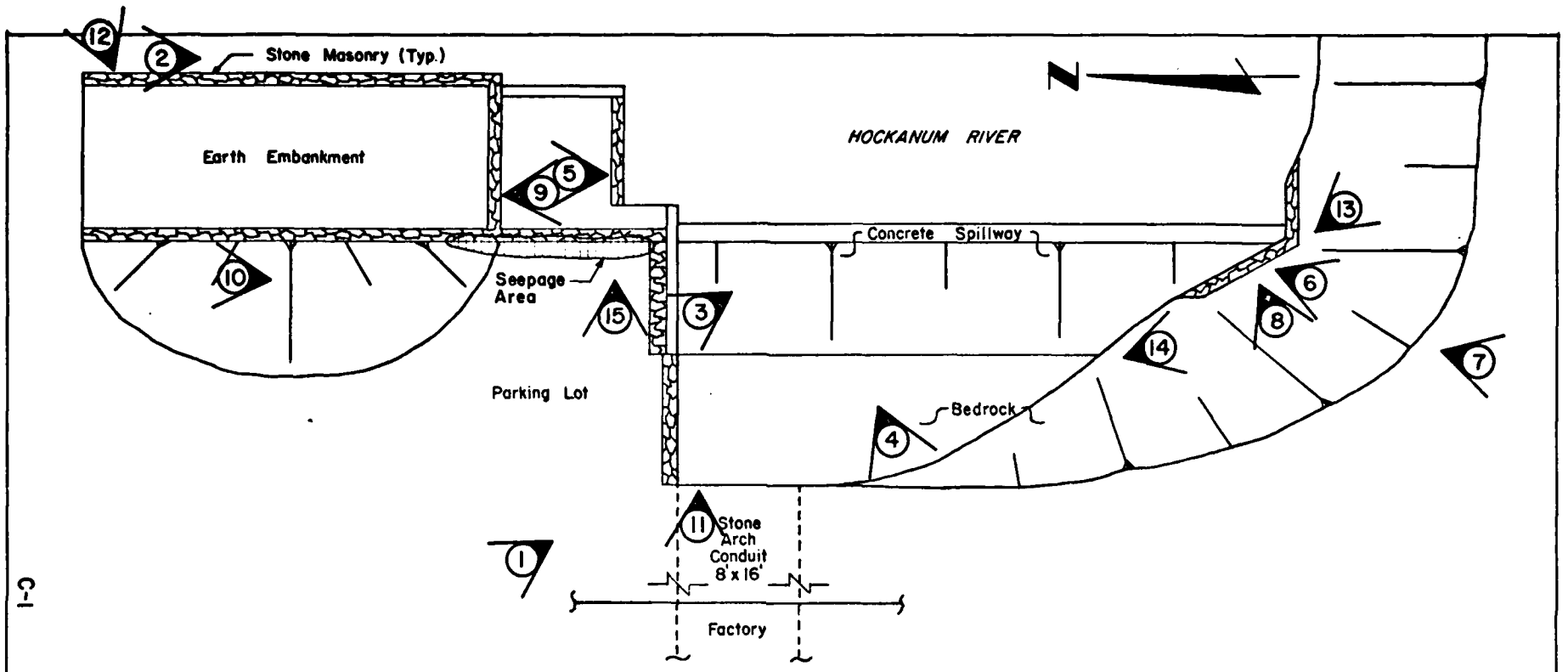
Very truly yours,

John J. Mozzochi and Associates
Civil Engineers

JJM:hk

APPENDIX C

PHOTOGRAPHS



C-1

LEGEND

5 Number refers to caption. Arrow indicates direction of photograph.

HOCKANUM RIVER DAM
PHOTO LOCATION MAP

PHOTO #1: Downstream face of the dam

PHOTO #2: Upstream face of dam, viewed from upstream of the right abutment

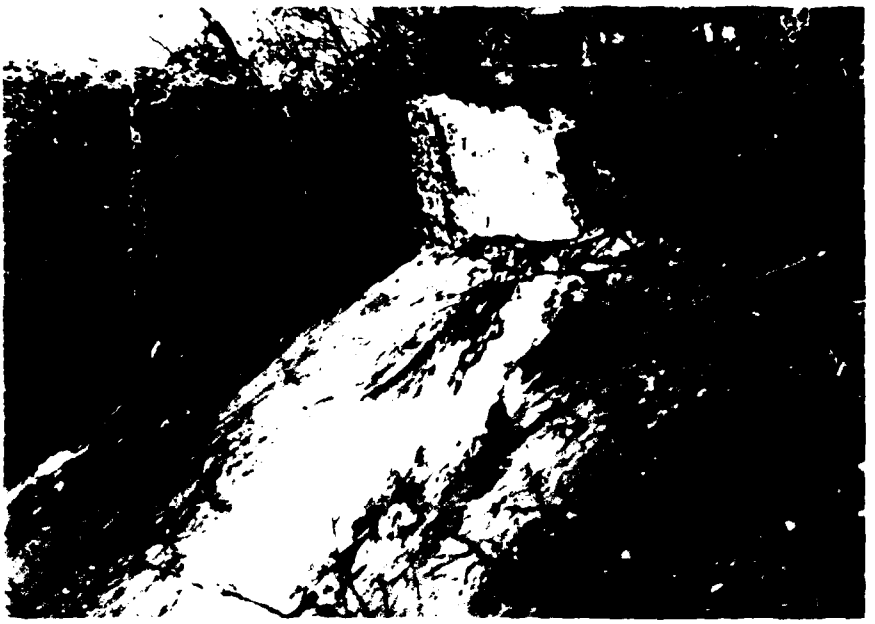


PHOTO #3: Left abutment

PHOTO #4: Right spillway training wall

PHOTO #5: Left abutment, from right side of spillway

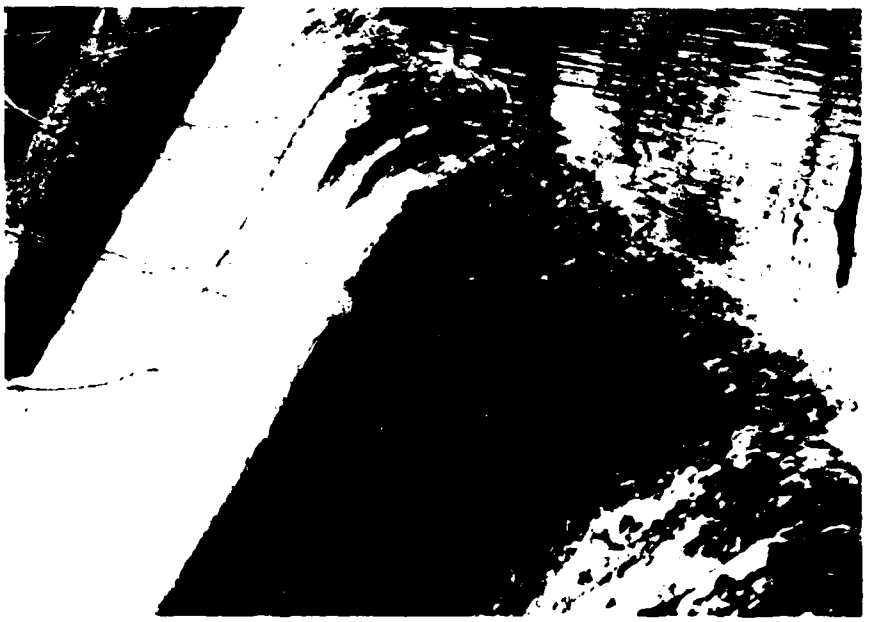


PHOTO #6: Crest of spillway, from left abutment

PHOTO #7: Crest of dam, viewed from left abutment

PHOTO #8: Impoundment area, note outlet work

PHOTO #9: Crest of dam, from right side of spillway looking toward right abutment

PHOTO #10: Downstream face of earth embankment

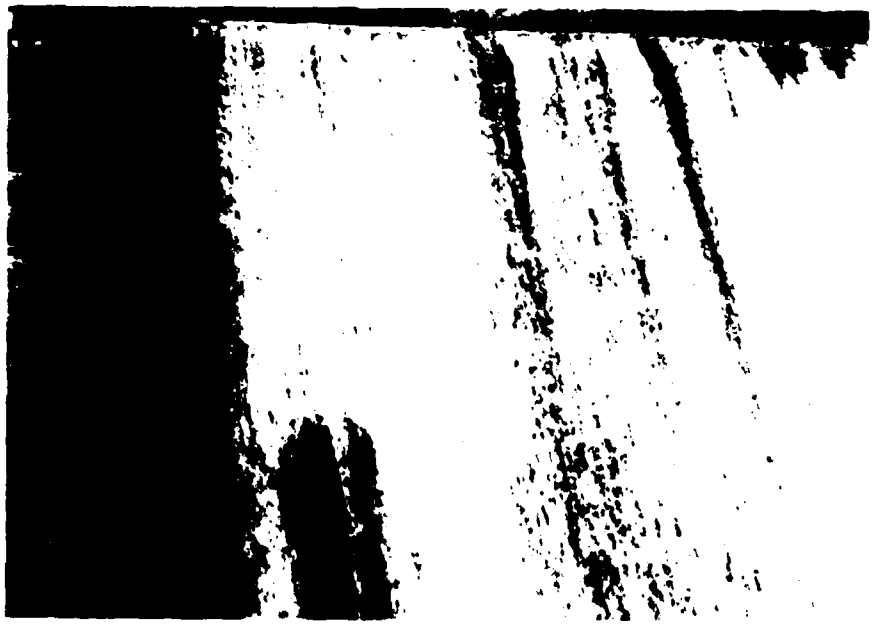


PHOTO #11: Right side of spillway, note conduit in lower left corner of photo

PHOTO #12: Tree with roots growing into the upstream face at right abutment

PHOTO #13: Spillway channel

PHOTO #14: Tunnel that carries spillway discharge below downstream building

PHOTO #15: Downstream face of earth embankment section just to the right of spillway. Note seepage

PHOTO #16: Reservoir Area

APPENDIX D

HYDROLOGIC AND HYDRAULIC

COMPUTATIONS

PROJECT 114 90 10
HACKANUM RIVER DAM

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA NEW HAVEN CONN 06510 203/789-1260

SHEET NO. 1 OF 10
BY RAC DATE 7-14-80
CHK'D. BY PB DATE 7-15-80

DETERMINATION OF SPILLWAY TEST FLOOD*

A. SIZE CLASSIFICATION

Storage Volume (Ac.-Ft.) 18

Height of Dam (Ft.) 37

Size Classification SMALL

B. HAZARD POTENTIAL CLASSIFICATION

Category	Loss of Life	Economic Loss
Low	None expected	Minimal
Significant	Few	Appreciable
(High)	(More than few)	(Excessive)

Hazard Classification HIGH

C. HYDROLOGIC EVALUATION GUIDELINES

Hazard	Size	Spillway Test Flood
Low	Small	50 to 100-Year Frequency
	Intermediate	100-Year Frequency to 1/2 PMF
	Large	1/2 PMF to PMF
Significant	Small	100-Year Frequency to 1/2 PMF
	Intermediate	1/2 PMF to PMF
	Large	PMF
(High)	(Small)	(1/2 PMF) to PMF
	Intermediate	PMF
	Large	PMF

Spillway Test Flood 1/2 PMF

*Based upon "Recommended Guidelines for Safety Inspection of Dams" Department of the Army, Office of the Chief of Engineers, November 1976.

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

DETERMINATION OF THE

MAXIMUM PROBABLE FLOOD (MPF)

AT SHENIPSIT LAKE

A. Drainage Area in Square Miles 16.5

B. Watershed Characteristic: Flat & Coastal

Rolling

Moutainous

C. M.P.F. in CFS/Square Mile,* 1500

M.P.F. = (CFS/Square Mile) x (Area in Square Miles)

1500 x 16.5 = 24,750

$\frac{1}{2}$ PMF = $\frac{1}{2}$ (24,750) = 12,375 CFS

*Based upon the figure "Maximum Probable Flood Peak Flow Rates" U.S. Army Corps of Engineers, December 1977.

SHENIPSIT LAKE INFLOW

THE PMP RAINFALL IS 24 INCHES FOR A 6 HOUR DURATION STORM. USING A 20% FACTOR FOR IMPERFECT FIT, THE EFFECTIVE RAINFALL IS 19.2 INCHES (SEE FIG. 15, DESIGN OF SMALL DAMS).

RUNOFF

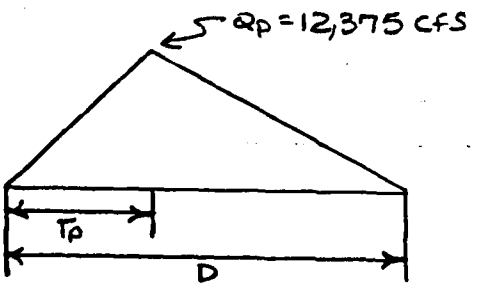
BASED ON AN ASSUMED C_N OF 80 (FOR GLACIAL TILL SOILS), THE RUNOFF IS 16.5 INCHES (FIG. A-4 DESIGN OF SMALL DAMS)

VOLUME OF RUNOFF =

$$\tfrac{1}{2} PMF = \tfrac{1}{2}\left(16.5 \tfrac{"}{12"/FT}\right)(16.5 mi^2)\left(640 \tfrac{AC}{mi^2}\right) = 7{,}260 \text{ AC-FT}$$

HYDROGRAPH

A TRIANGULAR HYDROGRAPH IS TO BE USED FOR THE ROUTING OF THE TEST FLOOD THROUGH THE RESERVOIR, PEAK FLOW EQUALS 12,375 CFS. SET DURATION OF RUNOFF SO AS TO CONTAIN VOLUME OF RUNOFF, AND RECEDING LIMB EQUALS TWICE THE RISING LIMB.



$$VOL = \tfrac{1}{2} Q_p D$$

$7260 = \frac{1}{2} Q_p D$

$$D = \frac{7260 \text{ AC-FT } (43{,}560 \text{ FT}^2/\text{AC})}{.5\,(12{,}375 \text{ CFS})\left(60 \frac{\text{SEC}}{\text{MIN}}\right)\left(60 \frac{\text{MIN}}{\text{HR}}\right)} = 14.2 \text{ HOURS}$$

SAY 15.0 HOURS

TRIANGULAR HYDROGRAPH

$Q_p = 12{,}375$ CFS
$D = 15.0$ HRS
$T_p = 5.0$ HRS

SHENIPSIT LAKE

TIME HRS	INFLOW CFS
0	0
1	2475
2	4950
3	7425
4	9900
5	12,375
6	11,137
7	9,900
8	8662
9	7425
10	6187
11	4950
12	3712
13	2475
14	1237
15	0

SHENIPSIT LAKE DATA

(FROM PHASE I INVESTIGATION REPORT by OTHERS, DATED SEPT 1978, I.D.# 00209)

STAGE (FT)	AREA, AC
511	440
520	725
530	750

STAGE, FT	DISCHARGE, CFS
511	0
513	400
514	600
516	1,400
518	3,000
520	5,500
522	9,600
524	15,000
526	21,500

SHENIPSIT LAKE 799010 FLOOD ROUTING RAC JULY 15

INPUT DATA: STAGE / DISCHARGE

S=511.00FT Q= 0CFS S=513.00FT Q= 400CFS S=514.00FT Q= 600CFS S=516.00FT Q= 1,400CFS
S=518.00FT Q= 3,000CFS S=520.00FT Q= 5,500CFS S=522.00FT Q= 9,600CFS S=524.00FT Q=15,000CFS
S=526.00FT Q=21,500CFS
IE=511.0 IV= 0.0 E=511.0 A=440.00 E=520.0 A=725.00 E=530.0 A=750.00

HOUR	INFLOW	MASS INFLOW	WATER EL.	TAIL WATER	OUTFLOW	MASS OUTFLOW	STORAGE(R)	STORAGE(A)
0.00	0CFS	0.00AC-F	511.00FT	511.00FT	0CFS	0.00AC-F	0.00AC-F	0.00AC-F
1.00	2,475CFS	102.27AC-F	511.22FT	0.00FT	45CFS	1.87AC-F	100.40AC-F	100.40AC-F
2.00	4,950CFS	409.09AC-F	511.87FT	0.00FT	175CFS	10.98AC-F	398.10AC-F	398.10AC-F
3.00	7,425CFS	920.45AC-F	512.88FT	0.00FT	377CFS	33.83AC-F	886.62AC-F	886.62AC-F
4.00	9,900CFS	1,636.36AC-F	514.17FT	0.00FT	671CFS	77.19AC-F	1,559.17AC-F	1,559.17AC-F
5.00	12,375CFS	2,556.81AC-F	515.66FT	0.00FT	1,267CFS	157.33AC-F	2,399.48AC-F	2,399.48AC-F
6.00	11,137CFS	3,528.38AC-F	517.02FT	0.00FT	2,221CFS	301.50AC-F	3,226.87AC-F	3,226.87AC-F
7.00	9,900CFS	4,397.68AC-F	518.03FT	0.00FT	3,043CFS	519.04AC-F	3,878.63AC-F	3,878.63AC-F
8.00	8,662CFS	5,164.71AC-F	518.74FT	0.00FT	3,931CFS	807.23AC-F	4,357.47AC-F	4,357.47AC-F
9.00	7,425CFS	5,829.46AC-F	519.20FT	0.00FT	4,501CFS	1,155.71AC-F	4,673.75AC-F	4,673.75AC-F
10.00	6,187CFS	6,391.94AC-F	519.45FT	0.00FT	4,817CFS	1,540.79AC-F	4,851.14AC-F	4,851.14AC-F
11.00	4,950CFS	6,852.14AC-F	519.53FT	0.00FT	4,919CFS	1,943.12AC-F	4,909.02AC-F	4,909.02AC-F
12.00	3,712CFS	7,210.08AC-F	519.47FT	0.00FT	4,839CFS	2,346.36AC-F	4,863.71AC-F	4,863.71AC-F
13.00	2,475CFS	7,465.74AC-F	519.28FT	0.00FT	4,601CFS	2,736.46AC-F	4,729.28AC-F	4,729.28AC-F
14.00	1,237CFS	7,619.13AC-F	518.97FT	0.00FT	4,222CFS	3,101.06AC-F	4,518.06AC-F	4,518.06AC-F
15.00	0CFS	7,670.24AC-F	518.57FT	0.00FT	3,717CFS	3,429.18AC-F	4,241.06AC-F	4,241.06AC-F
16.00	0CFS	7,670.24AC-F	518.15FT	0.00FT	3,187CFS	3,714.54AC-F	3,955.69AC-F	3,955.69AC-F
17.00	0CFS	7,670.24AC-F	517.77FT	0.00FT	2,819CFS	3,962.79AC-F	3,707.45AC-F	3,707.45AC-F
18.00	0CFS	7,670.24AC-F	517.43FT	0.00FT	2,546CFS	4,184.53AC-F	3,485.71AC-F	3,485.71AC-F

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

TIME (HOURS)	SHENIPSIT LAKE INFLOW (CFS)	SHENIPSIT LAKE OUTFLOW (CFS)	HOCKANUM RIVER INFLOW (CFS)
0	0	0	0
1	2475	45	47
2	4950	175	182
3	7425	377	392
4	9900	671	698
5	12,375	1,267	1318
6	11,137	2,221	2310
7	9,900	3,043	3165
8	8,662	3,931	4088
9	7,425	4,501	4681
10	6,187	4,817	5010
11	4,950	4,919	5116
12	3,712	4,839	5033
13	2,475	4,601	4785
14	1,237	4,222	4391
15	0	3,717	3866
16	0	3,187	3314
17	0	2,819	2932
18	0	2,546	2648

THE INFLOW HYDROGRAPH USED TO EVALUATE THE HOCKANUM RIVER DAM WAS SET EQUAL TO 104% OF THE SHENIPSIT LAKE DAM OUTFLOW HYDROGRAPH

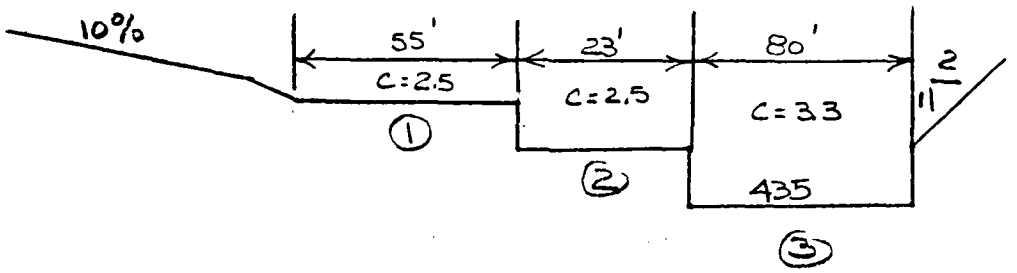
PROJECT 79 90 10
HOCKANUM RIVER DAM
OCKVILLE CONN

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

SHEET NO. 8 OF 10
BY AC DATE 4-11-80
CHK'D. BY JGM DATE 5-19-80

HOCKANUM RIVER DAM

SPILLWAY AND OVERFLOW SECTION DATA N.T.S.



SEGMENT	ITEM	C	LENGTH	ELEV. (USGS)
1	EARTH BANK W/4" TREES	2.5	55'	442.3
2	MASONRY & EARTH EMBANKMENT	2.5	23	438.8
③	OGEE SPILLWAY	3.3	80'	435 (USGS MAP)

IE = 435
IV = 0
E = 435 A = 0.5
E = 470 A = 7.3

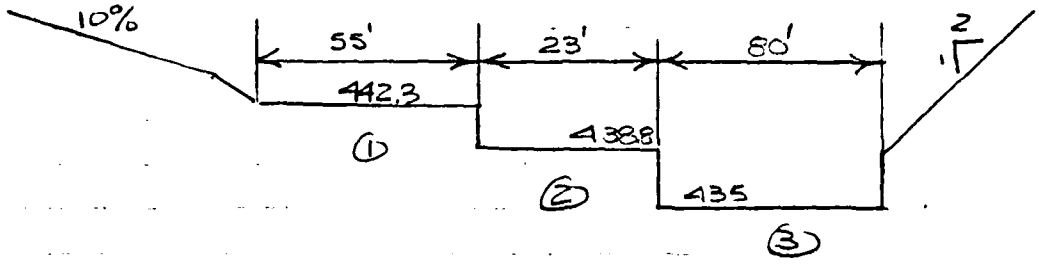
PROJECT 79 90 10
HOCKANUM RIVER DAM
DANIELSON CONN

FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

SHEET NO. 9 OF 10
BY RAC DATE 4-11-83
CHK'D. BY DKS DATE 4-23-83

HOCKANUM RIVER DAM

STAGE DISCHARGE DATA NTS



	436	437	438	438.9	439	440	441	442	442.3	443	444
$Q_1=(2.5)(55)(H)^{1.5}$ $=137.5\,H^{1.5}$									0	81	305
$Q_2=(2.5)(23)(H)^{1.5}$ $=57.5\,H^{1.5}$				0	5	76	188	329	377	495	682
$Q_3=(3.3)(80)(H)^{1.5}$ $=264\,H^{1.5}$	264	747	1372	1956	2112	2952	3880	4889	5207	5974	7128
	264	747	1372	1956	2117	3028	4068	5218	5584	6550	8115

PROJECT 79010
1 OCEANIUM RIVER DAM
OCEUILLE CT

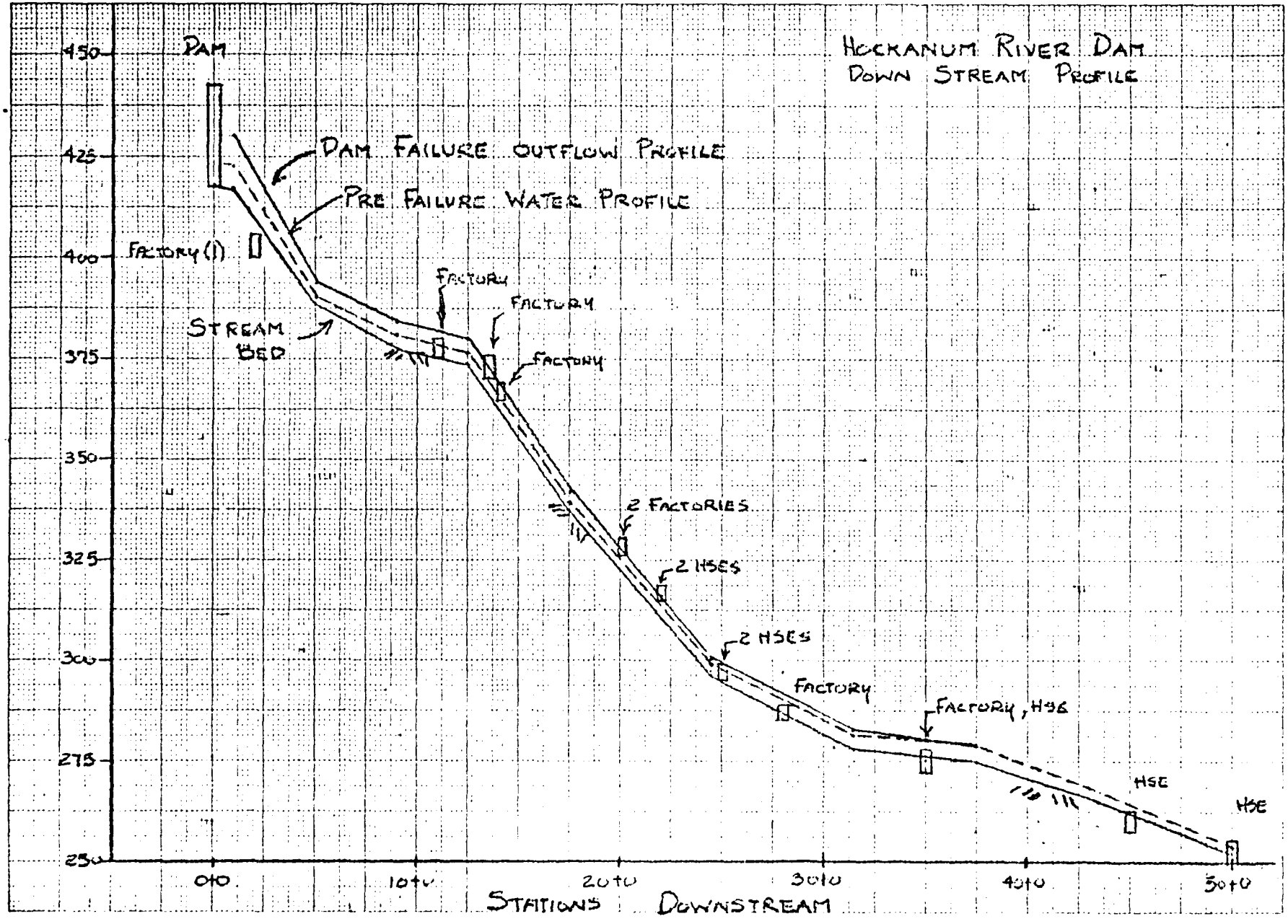
FLAHERTY-GIAVARA ASSOCIATES
ENVIRONMENTAL DESIGN CONSULTANTS
ONE COLUMBUS PLAZA, NEW HAVEN, CONN 06510/203/789-1260

SHEET NO. 10 OF 10
BY RAC DATE 4-14-8
CHK'D. BY DKS DATE 4-23-80

DOWNSTREAM DAM FAILURE IMPACT

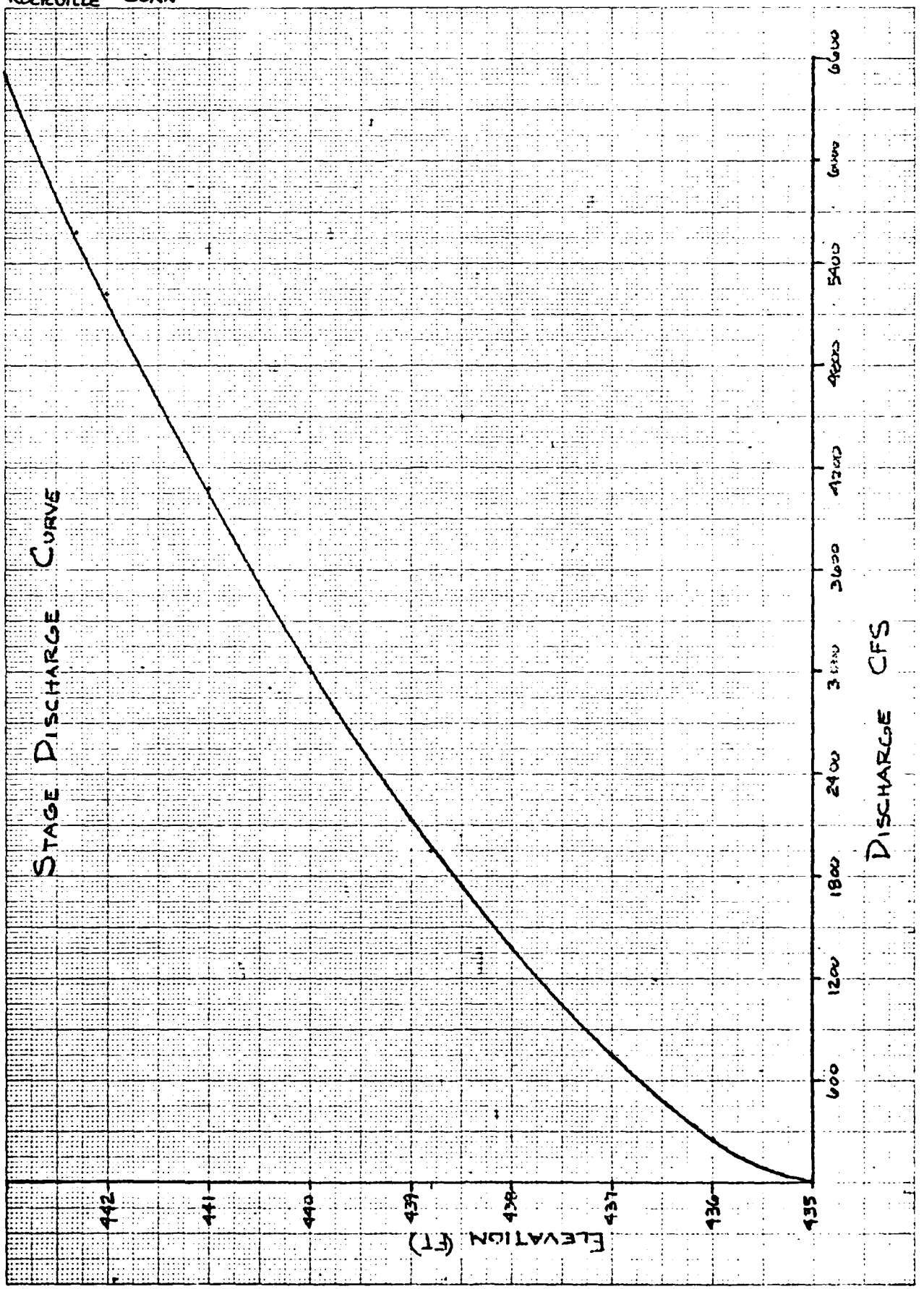
Bldg ELEV.	FLDWAVE	BASE FLOW	ESTIMATED FLOW DEPTHS AT BUILDINGS FAILURE	BASE FLOW	DIFFERENCE
400	415	410	15	5	10
390	394	391	3	1	2
385	391	387	3	0	3
388	391	387	3	0	3
380	385	380	5	0	5
380	382	379	2	0	2
360	362	360	2	0	2
329	330	329	1	0	1
310	313	311	3	1	2
288	290	289	2	1	1
277	281	280	4	3	1
255	253	253	1	1	0
249	252	252	3	3	0
248	249	249	1	1	0
247	249	249	2	2	0

THE ASSUMED DAM FAILURE WOULD CAUSE A INCREASE IN FLOOD DEPTHS AT 11 BUILDINGS, 9 OF WHICH WOULD NOT BE SUBJECT TO SEVERE FLOODING.



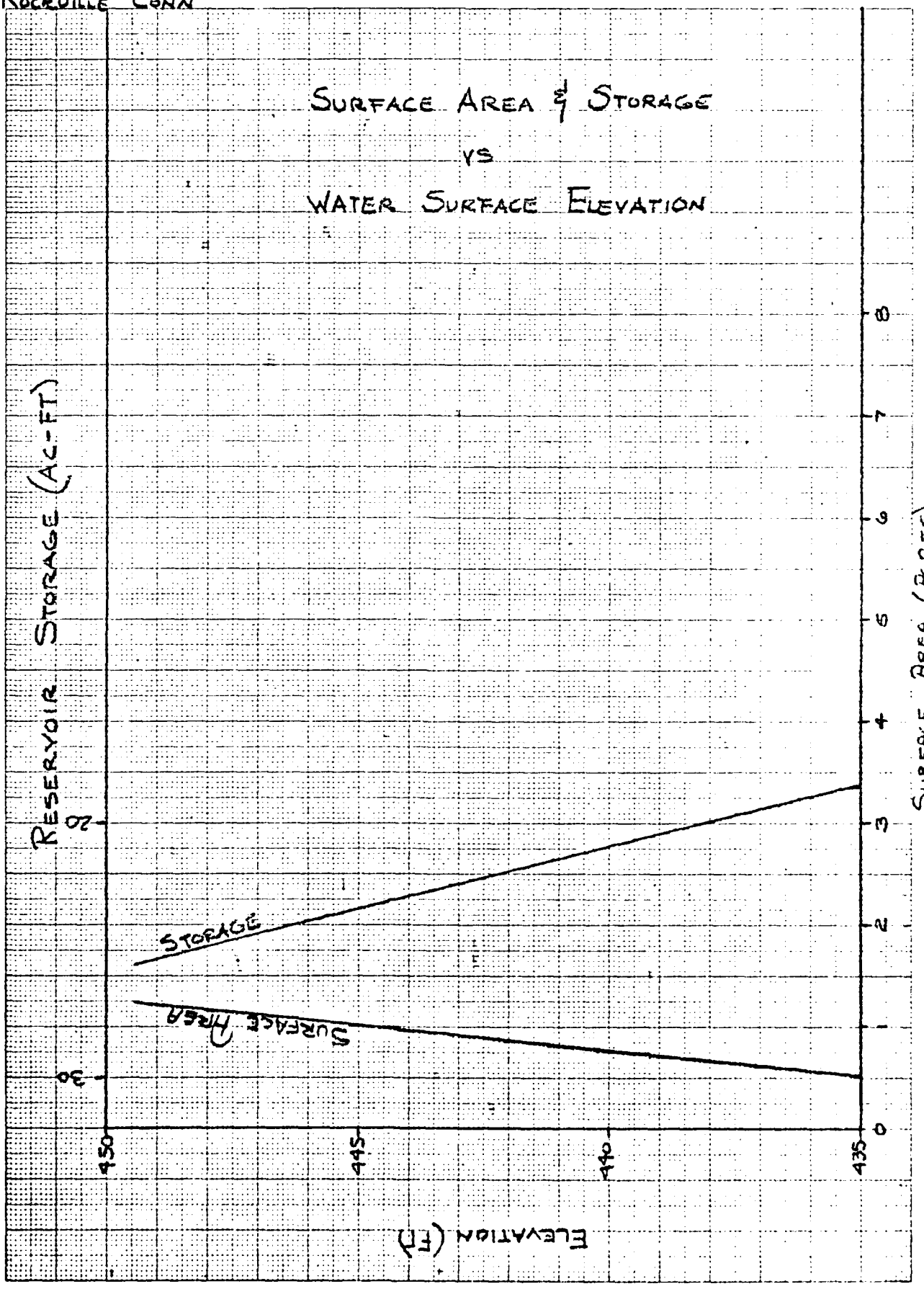
79 90 10
HOCKANIUM RIVER DAM
ROCKVILLE CONN

RAC 4-14-80
DKS 4-23-80



799010
HOCKANIUM RIVER DAM
ROCKVILLE CONN

RAC 7-16-80



INPUT DATA: UNSUBMERGED WEIR
SEGMENT 1 DISCHARGE COEFFICIENT = 2.5 LENGTH OF WEIR = 55 ELEVATION OF WEIR = 442.3
SEGMENT 2 DISCHARGE COEFFICIENT = 2.5 LENGTH OF WEIR = 23 ELEVATION OF WEIR = 438.8
SEGMENT 3 DISCHARGE COEFFICIENT = 3.3 LENGTH OF WEIR = 80 ELEVATION OF WEIR = 43
IE=435.0 IV= 0.0 E=435.0 A= 0.50 E=470.0 A= 7.30

HOUR	INFLOW	MASS INFLOW	WATER EL.	TAIL WATER	OUTFLOW	MASS OUTFLOW	STORAGE(R)	STORAGE(A)
0.00	0CFS	0.00AC-F	435.00FT	435.00FT	0CFS	0.00AC-F	0.00AC-F	0.00AC-F
1.00	47CFS	1.94AC-F	435.29FT	0.00FT	43CFS	1.78AC-F	0.15AC-F	0.15AC-F
2.00	182CFS	11.40AC-F	435.77FT	0.00FT	178CFS	10.96AC-F	0.44AC-F	0.44AC-F
3.00	392CFS	35.12AC-F	436.28FT	0.00FT	386CFS	34.31AC-F	0.80AC-F	0.80AC-F
4.00	698CFS	80.16AC-F	436.90FT	0.00FT	691CFS	78.86AC-F	1.30AC-F	1.30AC-F
5.00	1,318CFS	163.47AC-F	437.89FT	0.00FT	1,301CFS	161.20AC-F	2.26AC-F	2.26AC-F
6.00	2,310CFS	313.38AC-F	439.20FT	0.00FT	2,289CFS	309.57AC-F	3.81AC-F	3.81AC-F
7.00	3,165CFS	539.62AC-F	440.12FT	0.00FT	3,154CFS	534.50AC-F	5.11AC-F	5.11AC-F
8.00	4,088CFS	839.33AC-F	440.99FT	0.00FT	4,065CFS	832.84AC-F	6.49AC-F	6.49AC-F
9.00	4,681CFS	1,201.69AC-F	441.54FT	0.00FT	4,680CFS	1,194.26AC-F	7.43AC-F	7.43AC-F
10.00	5,010CFS	1,602.14AC-F	441.81FT	0.00FT	4,998CFS	1,594.22AC-F	7.92AC-F	7.92AC-F
11.00	5,116CFS	2,020.57AC-F	441.92FT	0.00FT	5,122CFS	2,012.46AC-F	8.11AC-F	8.11AC-F
12.00	5,033CFS	2,439.95AC-F	441.84FT	0.00FT	5,029CFS	2,431.99AC-F	7.96AC-F	7.96AC-F
13.00	4,785CFS	2,845.66AC-F	441.64FT	0.00FT	4,797CFS	2,838.05AC-F	7.60AC-F	7.61AC-F
14.00	4,391CFS	3,224.83AC-F	441.29FT	0.00FT	4,393CFS	3,217.84AC-F	6.99AC-F	6.99AC-F
15.00	3,866CFS	3,566.03AC-F	440.82FT	0.00FT	3,881CFS	3,559.81AC-F	6.21AC-F	6.21AC-F
16.00	3,314CFS	3,862.72AC-F	440.29FT	0.00FT	3,318CFS	3,857.36AC-F	5.36AC-F	5.36AC-F
17.00	2,932CFS	4,120.82AC-F	439.91FT	0.00FT	2,941CFS	4,116.02AC-F	4.79AC-F	4.79AC-F
18.00	2,648CFS	4,351.40AC-F	439.60FT	0.00FT	2,649CFS	4,347.04AC-F	4.36AC-F	4.36AC-F

FGA FLOOD WAVE ROUTING

APPROXIMATE FLOOD WAVE ROUTING BASED UPON U.S. ARMY CORPS OF ENGINEERS' "RULE OF THUMB GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS" DATED APRIL, 1978.

INITIAL STATION = 0 +0
INITIAL BASE FLOW = 1,956 CFS
INITIAL WAVE HEIGHT = 37.0 FT
ASSUMED BREACH WIDTH = 68.0 FT
INITIAL RESERVOIR STORAGE = 18 ACRE-FT
COMPUTED FLOOD WAVE PEAK FLOW = 23,824 CFS
TOTAL FLOOD WAVE PEAK FLOW = 25,780CFS

STATION 1 +0

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-350.0 FT	450.0 FT	-75.0 FT	430.0 FT	-10.0 FT	418.0 FT
		N = 0.030			
-10.0 FT	418.0 FT	10.0 FT	418.0 FT		
		N = 0.050			
10.0 FT	418.0 FT	150.0 FT	430.0 FT	200.0 FT	450.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
425.6 SF	73.2 FT	0.050	9.6 FPS	4,088CFS
250.3 SF	20.0 FT	0.030	26.7 FPS	6,687CFS
913.1 SF	141.9 FT	0.050	10.2 FPS	9,388CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
418.0 FT	12.5 FT	430.5 FT	1,589 SF	12.6 FPS	20,164 CFS	0.0100

BASE FLOW = 1,956 CFS BASE STAGE = 422.3 FT.

STATION 5+00

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-100.0 FT	400.0 FT	-75.0 FT	390.0 FT	-10.0 FT	388.0 FT
		N = 0.030			
-10.0 FT	388.0 FT	10.0 FT	388.0 FT		
		N = 0.050			
10.0 FT	388.0 FT	75.0 FT	390.0 FT	175.0 FT	400.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
258.8 SF	72.6 FT	0.050	17.9 FPS	4,635CFS
96.5 SF	20.0 FT	0.030	36.5 FPS	3,529CFS
288.8 SF	93.4 FT	0.050	16.2 FPS	4,704CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
388.0 FT	4.8 FT	392.8 FT	644 SF	19.9 FPS	12,869 CFS	0.0607

BASE FLOW = 1,956 CFS DACE STAGE = 390.0 FT.

STATION 9+00

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-250.0 FT	400.0 FT	-125.0 FT	390.0 FT	-10.0 FT	378.0 FT
		N = 0.030			
-10.0 FT	378.0 FT	10.0 FT	378.0 FT		
		N = 0.050			
10.0 FT	378.0 FT	175.0 FT	390.0 FT	300.0 FT	400.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
181.4 SF	59.2 FT	0.050	11.3 FPS	2,064CFS
123.0 SF	20.0 FT	0.030	30.2 FPS	3,718CFS
260.2 SF	84.8 FT	0.050	11.4 FPS	2,967CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
378.0 FT	6.1 FT	384.1 FT	564 SF	15.4 FPS	8,740 CFS	0.0330

BASE FLOW = 1,956 CFS BASE STAGE = 381.0 FT.

STATION 12+50

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-300.0 FT	390.0 FT	-175.0 FT	380.0 FT	-10.0 FT	374.0 FT
		N = 0.030			
-10.0 FT	374.0 FT	10.0 FT	374.0 FT		
		N = 0.050			
10.0 FT	374.0 FT	50.0 FT	380.0 FT	200.0 FT	390.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
498.9 SF	165.4 FT	0.050	5.8 FPS	2,937CFS
120.4 SF	20.0 FT	0.030	15.5 FPS	1,874CFS
120.9 SF	40.8 FT	0.050	5.8 FPS	703CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
374.0 FT	6.0 FT	380.0 FT	740 SF	7.4 FPS	5,515 CFS	0.0050

BASE FLOW = 1,956 CFS BASE STAGE = 377.8 FT.

STATION: 17+50

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-100.0 FT	350.0 FT	-90.0 FT	340.0 FT	-10.0 FT	337.0 FT
		N = 0.030			
-10.0 FT	337.0 FT	10.0 FT	337.0 FT		
		N = 0.050			
10.0 FT	337.0 FT	50.0 FT	340.0 FT	75.0 FT	350.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
141.9 SF	80.4 FT	0.050	11.8 FPS	1,676CFS
65.4 SF	20.0 FT	0.030	29.7 FPS	1,945CFS
71.0 SF	40.8 FT	0.050	11.6 FPS	831CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
337.0 FT	3.2 FT	340.2 FT	278 SF	15.9 FPS	4,453 CFS	0.0740

BASE FLOW = 1,950 CFS BASE STAGE = 330.2 FT.

STATION 24+50

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-350.0 FT	350.0 FT	-50.0 FT	300.0 FT	-10.0 FT	296.0 FT
		N = 0.030			
-10.0 FT	296.0 FT	10.0 FT	296.0 FT		
		N = 0.050			
10.0 FT	296.0 FT	75.0 FT	300.0 FT	250.0 FT	310.0 FT
650.0 FT	350.0 FT				

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
59.8 SF	34.7 FT	0.050	10.2 FPS	615CFS
69.2 SF	20.0 FT	0.030	27.2 FPS	1,882CFS
97.2 SF	56.3 FT	0.050	10.3 FPS	1,002CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
296.0 FT	3.4 FT	299.4 FT	226 SF	15.4 FPS	3,506 CFS	0.0580

BASE FLOW = 1,956 CFS BASE STAGE = 298.6 FT.

STATION 31+50

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-600.0 FT	350.0 FT	-475.0 FT	300.0 FT	-350.0 FT	290.0 FT
-10.0 FT	278.0 FT				
		N = 0.030			
-10.0 FT	278.0 FT	10.0 FT	278.0 FT		
		N = 0.080			
10.0 FT	278.0 FT	40.0 FT	290.0 FT	210.0 FT	350.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
176.7 SF	100.1 FT	0.050	6.9 FPS	1,237CFS
70.6 SF	20.0 FT	0.030	18.5 FPS	1,308CFS
15.5 SF	9.5 FT	0.080	4.1 FPS	64CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
278.0 FT	3.5 FT	281.5 FT	262 SF	9.9 FPS	2,610 CFS	0.0260

BASE FLOW = 1,950 CFS BASE STAGE = 281.0 FT.

STATION 37+50

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-475.0 FT	350.0 FT	-200.0 FT	300.0 FT	-130.0 FT	290.0 FT
-25.0 FT	280.0 FT	-10.0 FT	275.0 FT		
		N = 0.030			
-10.0 FT	275.0 FT	10.0 FT	275.0 FT		
		N = 0.050			
10.0 FT	275.0 FT	225.0 FT	280.0 FT		
		N = 0.080			
225.0 FT	280.0 FT	400.0 FT	350.0 FT		

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
21.5 SF	11.9 FT	0.050	3.1 FPS	67CFS
75.8 SF	20.0 FT	0.030	8.5 FPS	646CFS
309.3 SF	163.1 FT	0.050	3.2 FPS	995CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
275.0 FT	3.7 FT	278.7 FT	406 SF	4.2 FPS	1,709 CFS	0.0050

BASE FLOW = 1,956 CFS BASE STAGE = 279.0 FT.

STATION 43+50

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-350.0 FT	300.0 FT	-200.0 FT	280.0 FT	-50.0 FT	270.0 FT
-10.0 FT	265.0 FT				
		N = 0.030			
-10.0 FT	265.0 FT	10.0 FT	265.0 FT		
		N = 0.050			
10.0 FT	265.0 FT	100.0 FT	270.0 FT	300.0 FT	330.0 FT

AREA	WETTED PERIMETER	N	VELOCITY	FLOW
37.6 SF	24.7 FT	0.050	5.1 FPS	192CFS
61.3 SF	20.0 FT	0.030	13.6 FPS	835CFS
84.6 SF	55.2 FT	0.050	5.1 FPS	435CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
265.0 FT	3.0 FT	268.0 FT	183 SF	7.9 FPS	1,463 CFS	0.0170

BASE FLOW = 1,956 CFS BASE STAGE = 268.5 FT.

STATION 514.50

OFFSET	ELEV.	OFFSET	ELEV.	OFFSET	ELEV.
		N = 0.050			
-400.0 FT	260.0 FT	-10.0 FT	248.0 FT		
		N = 0.030			
-10.0 FT	248.0 FT	10.0 FT	248.0 FT		
		N = 0.050			
10.0 FT	248.0 FT	150.0 FT	260.0 FT		

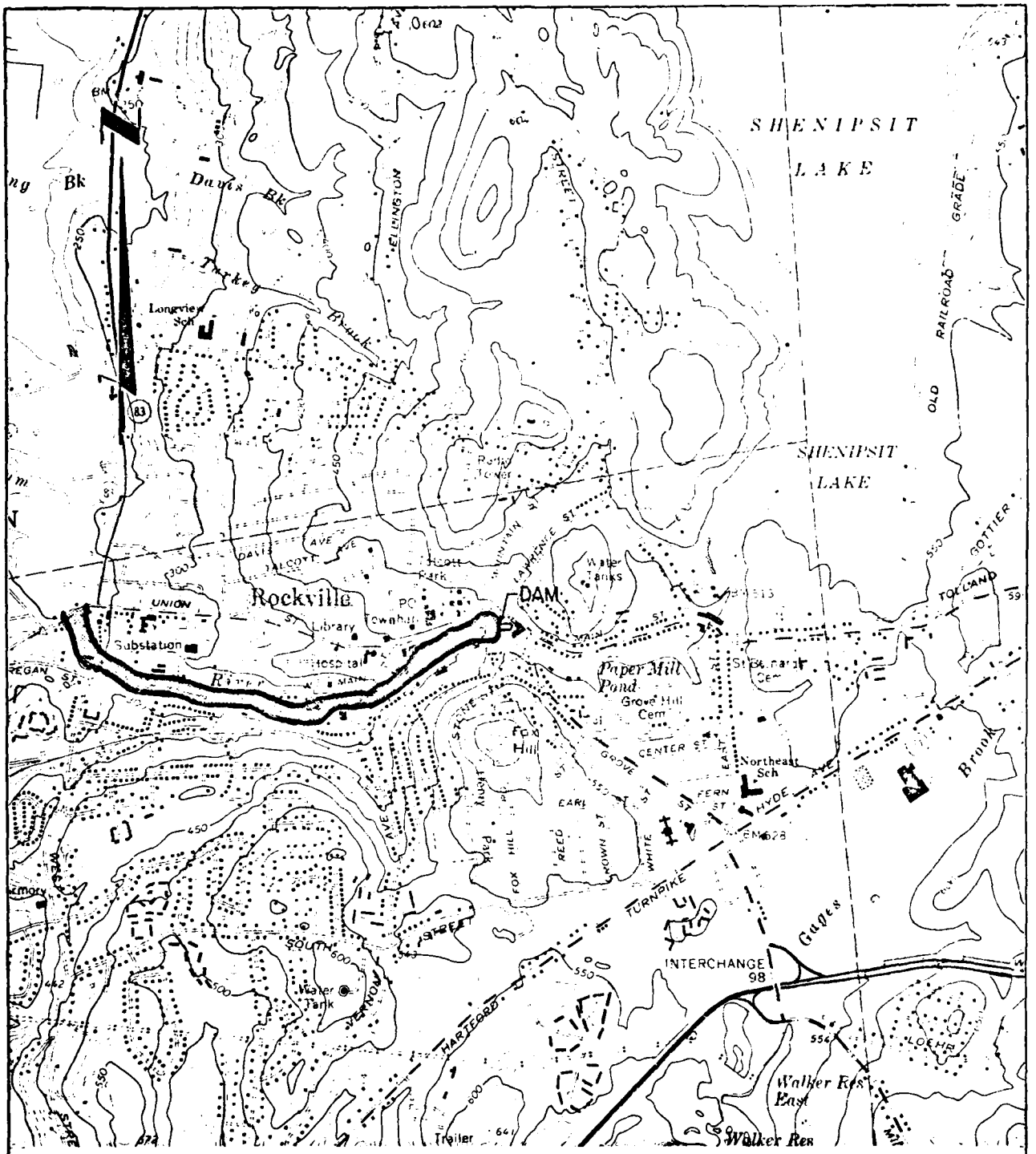
AREA	WETTED PERIMETER	N	VELOCITY	FLOW
90.4 SF	70.7 FT	0.050	4.8 FPS	435CFS
47.1 SF	20.0 FT	0.030	12.7 FPS	600CFS
32.4 SF	27.6 FT	0.050	4.7 FPS	155CFS

INVERT	DEPTH	W. SURFACE	AREA	VELOCITY	FLOW	SLOPE
248.0 FT	2.3 FT	250.3 FT	170 SF	7.0 FPS	1,191 CFS	0.0210

BASE FLOW = 1,956 CFS BASE STAGE = 250.9 FT.

HOCKANUM RIVER DAM
DRAINAGE MAP
VERNON , CONNECTICUT

FLAHERTY • GIAVARA ASSOCIATES, P.C.



HOCKANUM RIVER DAM
DAM FAILURE ANALYSIS
IMPACT AREAS
VERNON , CONNECTICUT

FLAHERTY • GIAVARA ASSOCIATES, P.C.

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	AGENCY	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
									MOOSEHORN RIVER DAM	4452.3	6720.0			

POPULAR NAME	NAME OF IMPOUNDMENT
	DOBSONVILLE POND

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
	10	MOOSEHORN RIVER	DOBSONVILLE	0	9000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)
E	1960	F	37	30	23	4

DIST OWN FED R PRV/FED SCS A VER/DATE
NED N N N N

REMARKS
CORPS ESTIMATE

D/S HAS	SPILLWAY CHEC (EN.)	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
	150	U	40	1950												

OWNER	ENGINEERING BY	CONSTRUCTION BY
ACCOUNT CORP		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
CORPS OF E	CORPS OF E	CORPS OF E	CORPS OF E

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
FLAHERTY GIAVARA ASSOCIATES	27	NOV	70	P.L. 92-367

REMARKS
MAIN DAM SPILLWAY


ATE
LME